

DECEMBER, 1930

25 Cents, \$1 a Year

162 Contractors *and* Engineers Monthly



A Large Concrete Culvert
on a
New State Highway
near Damascus, Va.
See page 74

Including
The
Consulting
Engineer

HERCULES ENGINES



**HEAVY-DUTY
POWER
FOR EVERY
ROAD BUILDING
REQUIREMENT**

**SEE THEM AT THE ROAD SHOW
ST. LOUIS JANUARY 10-15**

HERCULES MOTORS CORPORATION, CANTON, OHIO, U.S.A.

Where to Purchase

A comprehensive classification of the leading machinery and supply manufacturers arranged for the convenience of contractors, engineers and public officials who may wish to secure information about construction equipment.
The Index of Advertisers faces the inside back cover. When writing to advertisers please mention the CONTRACTORS & ENGINEERS MONTHLY. A star (*) before the manufacturer's name indicates that his advertisement appears in this issue.

This index is published as an aid to the reader, but the publishers assume no responsibility for errors or omissions.

AIR COMPRESSORS

*Allis-Chalmers Mfg. Co., Milwaukee
*Buhl Company, Chicago
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Independent Pa. Tool Co., Chicago
*National Brake & Elec. Co., Milwaukee
*Nove Engine Co., Lansing, Mich.
Acme Road Machy. Co., Frankfort, N. Y.
Beasmer Gas Engine Co., Grove City, Pa.
Cement-Gun Co., Allentown, Pa.
Chicago Pneumatic Tool Co., N. Y.
Curtis Pneumatic Machy. Co., St. Louis, Mo.
De Laval Steam Turbine Co., Trenton, N. J.
Fairbanks, Morse & Co., Chicago
Gardner-Denver Co., Quincy, Ill.
General Electric Co., Schenectady, N. Y.
Hardie-Tyner Mfg. Co., Birmingham, Ala.
Hobart Bros. Co., Troy, O.
Indiana Pump & Compr. Co., Indianapolis, Ind.
Ingersoll-Rand Co., N. Y.
Nordberg Mfg. Co., Milwaukee
Norwalk Co., So. Norwalk, Conn.
Schramm, Inc., West Chester, Pa.
Sullivan Machinery Co., Chicago
United Iron Works, Kansas City, Mo.
Wayne Co., Ft. Wayne, Ind.
Westinghouse Traction Brake Co., Wilmerding, Pa.
Worthington Pump & Machinery Corp., N. Y.
Yeomans Bros. Co., Chicago

AIR COMPRESSORS, PORTABLE

*Buhl Co., Chicago
*Domestic Eng. & Pump Co., Shippensburg, Pa.
*Independent Pa. Tool Co., Chicago
*Metalworld, Inc., Philadelphia, Pa.
*National Brake & Elec. Co., Milwaukee
*O. K. Clutch & Mach. Co., Columbia, Pa.
*Sterling Machy. Corp., Kansas City, Mo.
Chicago Pneumatic Tool Co., New York
Curtis Pneumatic Machy. Co., St. Louis, Mo.
Davey Compressor Co., Kent, Ohio
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., New York
Pasache Air Brush Co., Chicago
Schramm, Inc., West Chester, Pa.
Sullivan Machinery Co., Chicago

ARTESIAN WELL DRILLS & PUMPS

American Well Works, Aurora, Ill.
Ingersoll-Rand Co., New York
Star Drilling Machine Co., Akron, O.

ASPHALT

*Colphalt Co., Cleveland
*Standard Oil Co. (Ind.), Chicago
*Standard Oil Co. (N. Y.), N. Y.
Atlantic Ref. Co., Inc., Philadelphia
Barber Asphalt Co., Philadelphia
Gulf Refining Co., Pittsburgh
Ky. Rock Asphalt Co., Louisville, Ky.
Natural Rk. Asphalt Corp., Owensboro, Ky.
Ohio Valley Rock Asphalt Co., Louisville, Ky.
Pioneer Asphalt Co., Lawrenceville, Ill.
Sinclair Ref. Co., Chicago
Standard Oil Co. of Cal., S. Francisco
Standard Oil Co. of La., N. Orleans
Standard Oil Co. of N. J., Newark
Texas Co., N. Y.
Utah Rock Asphalt Corp., Pueblo, Colo.
Warren Bros. Co., Boston

ASPHALT BLOCK

Heatings Pavement Co., N. Y.

ASPHALT BRICK

Asphalt Brick Co., St. Louis

ASPHALT CUTTERS

*Independent Pa. Tool Co., Chicago, Ill.
*Littleford Bros., Cincinnati
Chicago Pneumatic Tool Co., N. Y.
Dayton Pneum. Tool Co., Dayton, O.
Gardner-Denver Co., Quincy, Ill.
Ingersoll-Rand Co., N. Y.
Sullivan Machinery Co., Chicago

ASPHALT EMULSIONS

American Bitumuls Co., Baltimore, Md.
Colphalt Co. of Ohio, Cleveland
Colprovia Roads, Inc., New York

Filatosa Co., Boston
Headley Emulsified Prod. Co., Phila.

ASPHALT KETTLES (See Kettles for Asphalt and Tar Heating)

ASPHALT PLANTS, TOOLS, ETC.

*Austin-Western Rd. Machy. Co., Chicago
*Chausse Oil Burner Co., Elkhart, Ind.
*Connery & Company, Philadelphia
*F. D. Cummer & Son Co., Cleveland
*Littleford Bros., Cincinnati
*Mohawk Asphalt Heater Co., Schenectady, N. Y.
*Western Wheel Scraper, Aurora, Ill.
Aeroll Burner Co., West New York, N. J.
American Fin-Mix Co., Chicago
American Fork & Hoe Co., Cleveland
American Steel Wks., Kansas City, Mo.
Barber Asphalt Co., Philadelphia
Charleroi Iron Wks., Charleroi, Pa.
J. D. Farasey Mfg. Co., Cleveland, O.
Hetherington & Berner, Indianapolis
Hauck Mfg. Co., Brooklyn, N. Y.
Merriman Asphalt Plant, Inc., Lima, O.
Warren Bros. Co., Boston

ASPHALT POURING POTS (See Pots, Asphalt Pouring)

ASPHALT ROLLERS (See Road Rollers)

ASPHALT SURFACE HEATERS

*Chausse Oil Burner Co., Elkhart, Ind.
*Littleford Bros., Cincinnati
Aeroll Burner Co., West New York, N. J.
Barber Asphalt Co., Philadelphia
Equitable Asp. Maint. Co., Kan. City, Mo.
Hauck Mfg. Co., Brooklyn, N. Y.

BACKFILLERS

*Baker Mfg. Co., Springfield, Ill.
*Bay City Shovels, Inc., Bay City, Mich.
*General Wheelbarrow Co., Cleveland
*Koehring Co., Milwaukee, Wis.
*Osgood Company, Marion, Ohio
*Parsons Co., Merion, Pa.
*Speeder Mch. Corp., Cedar Rapids, Iowa
*W.E.M. Co., Houston, Tex.
Austin Mach. Corp., Muskegon, Mich.
Buckeye Trac. Ditcher Co., Findlay, O.
Bucyrus-Erie Co., So. Milwaukee, Wis.
Byers Mach. Co., Ravenna, O.
Cleveland Trencher Co., Euclid, Ohio
Construction Machy. Co., Waterloo, Ia.
Ersted Mfg. Co., Portland, Ore.
General Excavator Co., Marion, O.
Harnischfeger Corp., Milwaukee, Wis.
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa
Link-Belt Co., Chicago
Orion Crane & Shovel Co., Chicago
Star Drilling Mach. Co., Akron, O.
Weller Mfg. Co., Chicago

BAGS

Bates Valve Bag Corp., Chicago

BAG TRUCKS

Bates Valve Bag Corp., Chicago
Case Crane & Engg. Co., Columbus, O.

BALING PRESSES

Economy Baler Co., Ann Arbor, Mich.

BAR BENDERS AND CUTTERS

*Koehring Co., Milwaukee, Wis.
*Ransome Conc. Machy. Co., Dunellen, N. J.
Buffalo Forge Co., Buffalo, N. Y.
Concrete Steel Co., N. Y.
D. A. Hinman & Co., Sandwich, Ill.
J. L. Gleason & Co., Boston, Mass.
Kardong Bros., Minneapolis
McKenna Co., Cleveland, O.

BARRICADE SUPPORTS

Cleveland Steel Spec. Corp., Cleveland, O.

BAR TIES

Bates Valve Bag Corp., Chicago
Symons Clamp & Mfg. Co., Chicago

BATCH BOXES

*Blaw-Knox Co., Pittsburgh, Pa.
*Jos. Honhorst Co., Cincinnati
*Lakewood Eng. Co., Cleveland, O.

*Littleford Bros., Cincinnati

*Western Wheeled Scraper Co., Aurora, Ill.
Butler Bin Co., Waukesha, Wis.
Easton Car & Const. Co., Easton, Pa.
Easton Car & Const. Co. of Mo., Kansas, Mo.
Erie Steel Const. Co., Erie, Pa.
Fairfield Engineering Co., Marion, Ohio
Koppel Ind. Car & Equip. Co., Koppel, Pa.
Jas. B. Seaveras Co., Batavia, Ill.

BATCHERS (For Measuring Aggregates)

*Blaw-Knox Co., Pittsburgh, Pa.
*Erie Steel Construction Co., Erie, Pa.
*Heltzel Stl. Form & Ir. Co., Warren, O.
Butler Bin Co., Waukesha, Wis.
Fairfield Engineering Co., Marion, Ohio
Superior Engineering Co., Warren, Ohio

BEARINGS

Fafnir Bearing Co., New Britain, Conn.
Hyatt Roller Bear. Co., Harrison, N. J.
Link-Belt Co., Chicago
New Departure Mfg. Co., Bristol, Conn.
S. K. F. Industries, New York
Timken Roller Bearing Co., Canton, O.

BINS, CONCRETE TOWER

*Ransome Conc. Machy. Co., Dunellen, N. J.

BELT DRESSING

*Jos. Dixon Crucible Co., Jersey City, N. J.

BINS, STORAGE

*Austin-Western Rd. Mach. Co., Chicago
*Blaw-Knox Co., Pittsburgh, Pa.
*The Burch Corp., Crestline, Ohio
*Good Roads Mch. Co., Kennett Sq., Pa.
*Heltzel Stl. Form & Ir. Co., Warren, Ohio
*Industrial Brownhoist Corp., Cleveland, O.
Beaumont Mfg. Co., Philadelphia
Birmingham Tank Co., Birmingham, Ala.
Butler Bin Co., Waukesha, Wis.
Canton Art Metal Co., Canton, Ohio
Easton Car & Const. Co., Easton, Pa.
Erie Steel Construction Co., Erie, Pa.
Fairfield Engineering Co., Marion, Ohio
C. S. Johnson Co., Champaign, Ill.
Lancaster Iron Works, Inc., Lancaster, Pa.
Link-Belt Co., Chicago
Pioneer Gravel Eq. Mfg. Co., Minneapolis
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.
Jas. B. Seaveras Co., Batavia, Ill.
Universal Rd. Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

BITUMULS PAVEMENT

American Bitumuls Co., Baltimore, Md.

BLADES FOR GRADERS & SNOW PLOWS

*Austin-Western Rd. Machy. Co., Chicago
*Caterpillar Tractor Co., San Leandro, Cal.
*General Wheelbarrow Co., Cleveland
J. D. Adams Co., Indianapolis
Gallion Iron Works & Mfg. Co., Galion, Ohio
Shunk Mfg. Co., Bucyrus, Ohio

BLAST HOLE DRILLING MACHINES (See Well Drilling and Blast Hole Machines)

BLASTING POWDER (See Explosives)

BLOCKS AND TACKLE

*Boston & Lockport Blk. Co., Boston, Mass.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*Western Block Co., Lockport, N. Y.
Upson-Walton Co., Cleveland

BLOW TORCHES

*Chausse Oil Burner Co., Elkhart, Ind.
*G. H. Williams Co., Erie, Pa.
American Steel Wks., Kansas City, Mo.
Everhot Mfg. Co., Maywood, Ill.
Hauck Mfg. Co., Brooklyn, N. Y.

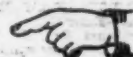
BLUE PRINT MACHINES

Paragon Revolute Corp'n, Rochester, N. Y.
O. F. Pease Co., Chicago
Wickes Bros., Saginaw, Mich.

BODIES, CONCRETE, AGITATOR & MIXER

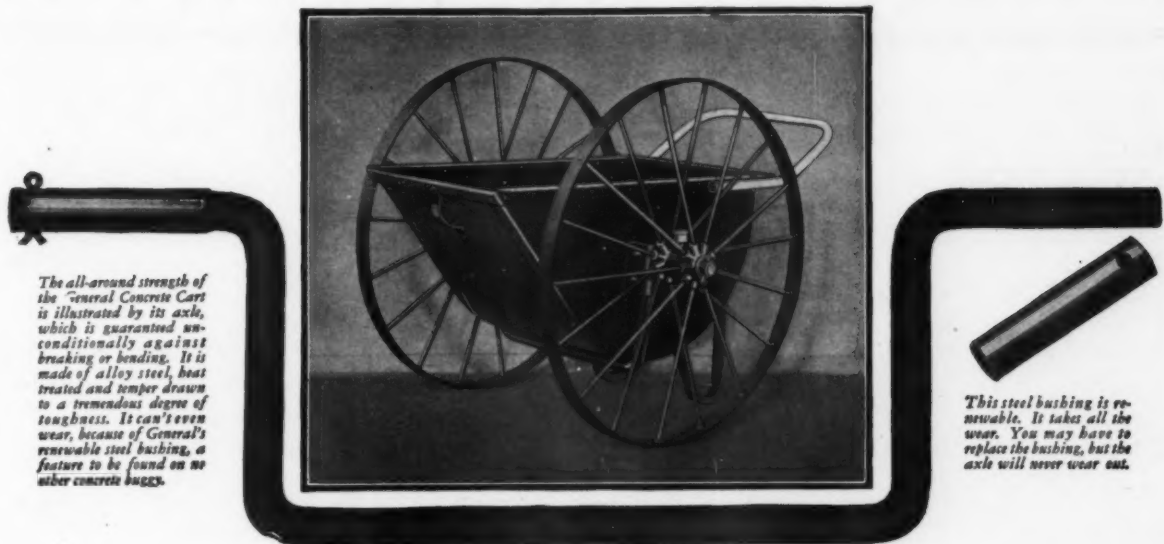
Bieh Iron Works, Reading, Pa.
Blaw-Knox Co., Pittsburgh

For Directory of Local Distributors of Contractors' Equipment, See Pages 123 to 150



WHERE TO PURCHASE

- Barrymore Conc. Mixer Corp.**, San Francisco
Good Rds. Machv. Corp., Kennett Sq., Pa.
Highway Truck Mixer Co., Cleveland
Lee Transit Mixer Co., Indianapolis
Parke Conc. Carrier, Inc., New York
Transit Mixers, Inc., San Francisco
- BOILERS**
***Johnston Bros., Inc.**, Ferrysburg, Mich.
***Manitowoc Eng'g Wks.**, Manitowoc, Wis.
Babcock & Wilcox Co., New York
Chandler & Taylor Co., Indianapolis
Chatta. Boiler & Tank Co., Chatta., Tenn.
R. D. Cole Mfg. Co., Newnan, Ga.
Erie City Iron Works, Erie, Pa.
Hartley Blr. Works, Montgomery, Ala.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Heine Boiler Co., St. Louis, Mo.
E. Keeler Co., Williamsport, Pa.
Jas. Leffel & Co., Springfield, Ohio
Burnham Boiler Corp., Irvington, N. Y.
Murray Iron Works Co., Burlington, Iowa
Nagle Eng. & Blr. Works, Erie, Pa.
New Bern Iron Works & Sup. Co., New Bern, N. C.
Orr & Sombower, Reading, Pa.
Petroleum Iron Works Co., Sharon, Pa.
J. S. Schofield's Sons Co., Macon, Ga.
Stanwood Corp., Cincinnati, Ohio
Superior Body Corp., Marion, Ind.
Vogt Mchv. Co., Inc., Louisville, Ky.
- BRACES, TRENCH**
***Templeton, Kenly & Co.**, Chicago
Jas. H. Channon Mfg. Co., Chicago
Duff-Norton Mfg. Co., Pittsburgh, Pa.
Kalamazoo Fdry. & Mach. Co., Kalamazoo, Mich.
- BRANDING TOOLS**
Everhot Mfg. Co., Maywood, Ill.
- BRASS GOODS**
Chase Brass & Copper Co., Inc., Waterbury, Conn.
Glauber Brass Mfg. Co., Cleveland, Ohio
Haydensville Co., Haydensville, Mass.
Hays Mfg. Co., Erie, Pa.
Mueller Company, Decatur, Ill.
Union Water Meter Co., Worcester, Mass.
United-Obendorf Corp., Cleveland, Ohio
- BREAKERS, CONCRETE**
***McKiernan-Terry Corp.**, New York
***Independent Pa. Tool Co.**, Chicago
Chicago Pneumatic Tool Co., N. Y.
Cleveland Rock Drill Co., Cleveland
Gardner-Denver Co., Quincy, Ill.
Gilman Mfg. Co., E. Boston, Mass.
Hardsoec Wonder Drill Co., Ottumwa, Iowa
Ingersoll-Rand Co., New York
Milwaukee Gas Tool Co., Milwaukee
Schramm, Inc., West Chester, Pa.
Sullivan Machy. Co., Chicago
- BRICK, PAVING (See Paving Brick)**
- BRIDGE FLOORS**
***Armco Culvert Mfrs. Assn.**, Middletown, O.
***Servicised Premoulded Products**, Chicago
American Bridge Co., N. Y.
W. R. Meadows, Inc., Elgin, Ill.
Wyckoff Pipe & Creos. Co., New York
- BRIDGES AND BUILDINGS, STEEL**
Bellefontaine Br. & Stl. Co., Bellefontaine, O.
Bethlehem Steel Co., Bethlehem, Pa.
Butler Mfg. Co., Minneapolis, Minn.
Central States Br. Co., Indianapolis, Ind.
Champion Bridge Co., Wilmington, Ohio
Chesapeake Iron Works, Baltimore, Md.
Clinton Bridge Works, Clinton, Iowa
Eastern Bridge & Struc. Co., Worcester, Mass.
Floor City Orn. Iron Co., Minneapolis
Fort Pitt Br. Works, Pittsburgh, Pa.
Ingalls Iron Works Co., Birmingham, Ala.
Inter. Steel & Iron Co., Evansville, Ind.
Lakeside Br. & Stl. Co., No. Milwaukee
Louisville Br. & Iron Co., Louisville, Ky.
McClintic-Marshall Co., Pittsburgh, Pa.
Milwaukee Br. Co., Milwaukee, Wis.
Minneapolis-Moline Power Impl. Co., Minneapolis
Missouri Vv. Br. & Ir. Co., Leavenworth, Kas.
Mt. Vernon Br. Co., Mt. Vernon, Ohio
Penn. Bridge Co., Beaver Falls, Pa.
Pittsburgh-Des Moines Stl. Co., Pittsburgh, Pa.
Richmond Struc. Stl. Co., Richmond, Va.
James B. Seaverns Co., Batavia, Ill.
Virginia Br. & Ir. Co., Roanoke, Va.
Wisc. Br. & Ir. Co., No. Milwaukee, Wis.
Vogt Mchv. Co., Inc., Louisville, Ky.
Wheeling Struc. Stl. Co., Wheeling, W. Va.
- BROOMS (See Street Sweeping Brooms)**
- BUCKETS, AUTOMATIC DUMPING**
***Lakewood Eng. Co.**, Cleveland, O.
***Union Iron Wks., Inc.**, Hoboken, N. J.
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.
- BUCKETS, CLAM SHELL**
***Blaw-Knox Co.**, Pittsburgh, Pa.
***Hayward Co.**, N. Y.
***Industrial Brownhoist Corp.**, Cleveland
***J. F. Kessler Co.**, Chicago
***Lakewood Eng. Co.**, Cleveland, Ohio
- *Manitowoc Eng'g Wks.**, Manitowoc, Wis.
***G. H. Williams Co.**, Erie, Pa.
Browning Crane Co., Cleveland, Ohio
Erie Steel Const'n Co., Erie, Pa.
Geo. Haisz Mfg. Co., New York
Link-Belt Co., Chicago
McMyler Interstate Co., Cleveland, Ohio
Mead-Morrison Mfg. Co., E. Boston, Mass.
Orton Crane & Shovel Co., Chicago
Owen Bucket Co., Cleveland, Ohio
Page Eng. Co., Chicago
- BUCKETS, CONCRETE HOIST**
***Insley Mfg. Co.**, Indianapolis, Ind.
***Jaeger Mach. Co.**, Columbus, O.
***Lakewood Eng. Co.**, Cleveland, Ohio
***Ransome Conc. Mchv. Co.**, Dunellen, N. J.
***Union Iron Works, Inc.**, Hoboken, N. J.
Norris K. Davis, San Francisco, Calif.
Koppel Ind. Car & Equip. Co., Koppel, Pa.
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.
- BUCKETS, DRAGLINE**
***Blaw-Knox Co.**, Pittsburgh, Pa.
***Dobbie Fdry. & Mach. Co.**, Niagara Falls, N. Y.
***Hayward Co.**, New York
***Sauerma Bros.**, Chicago
***Schofield-Burkett Constr. Co.**, Macon, Ga.
***G. H. Williams Co.**, Erie, Pa.
Beaumont Mfg. Co., Philadelphia
Bucyrus-Erie Co., So. Milwaukee, Wis.
Godfrey Conveyor Co., Elkhart, Ind.
Harnischfeger Corp., Milwaukee
Link-Belt Co., Chicago
Monaghan Mfg. Corp., Chicago
- BUCKETS, DREDGING AND EXCAVATING**
***Blaw-Knox Co.**, Pittsburgh, Pa.
***Hayward Co.**, N. Y.
***Industrial Brownhoist Corp.**, Cleveland
***J. F. Kessler Co.**, Chicago
***Lakewood Eng. Co.**, Cleveland, Ohio
***Manitowoc Eng'g Wks.**, Manitowoc, Wis.
***G. H. Williams Co.**, Erie, Pa.
Browning Crane Co., Cleveland
Bucyrus-Erie Co., So. Milwaukee, Wis.
Erie Steel Construction Co., Erie, Pa.
Geo. Haisz Mfg. Co., New York
Link-Belt Co., Chicago
Orton Crane & Shovel Co., Chicago
Owen Bucket Co., Cleveland, Ohio
Stockton Iron Wks., Stockton, Cal.
- BUCKETS, ORANGE PEEL**
***Hayward Co.**, N. Y.
Industrial Works, Bay City, Mich.
McMyler Interstate Co., Cleveland, Ohio
Orton Crane & Shovel Co., Chicago
- BUILDING FORMS (See Forms, Conc.)**
- BUILDINGS, STEEL (See Bridges)**
- BULLDOZERS**
***Baker Mfg. Co.**, Springfield, Ill.
***Euclid Crane & Hoist Co.**, Euclid, Ohio
***W. A. Riddell Co.**, Bucyrus, Ohio
***Trackson Co.**, Milwaukee, Wis.
***W. K. M. Co.**, Houston, Tex.
LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa
Miami Trailer-Scraper Co., Troy, Ohio
- BUNKS AND COTS**
Ft. Pitt Bedding Co., Pittsburgh, Pa.
Haggard & Marquson Co., Chicago
Southern Rome Co., Baltimore, Md.
- CABLES (See Wire and Cable)**
- CABLEWAYS, DRAGLINE**
***E. Flory Mfg. Co.**, Bangor, Pa.
***McKiernan-Terry Corp.**, New York
***Sauerma Bros.**, Chicago
***Schofield-Burkett Constr. Co.**, Macon, Ga.
***Street Bros. Mach. Works**, Chattanooga
Beaumont Mfg. Co., Philadelphia
Godfrey Conveyor Co., Elkhart, Ind.
L. P. Green, Chicago
Lidgerwood Mfg. Co., Elizabeth, N. J.
Link-Belt Co., Chicago
Mead-Morrison Mfg. Co., E. Boston, Mass.
Pioneer Motor Eq. Mfg. Co., Minneapolis
- CABS FOR MOTOR TRUCKS**
Highland Body Mfg. Co., Cincinnati, Ohio
Weatherproof Body Corp., Corunna, Mich.
- CAIRNS**
American Bridge Co., N. Y.
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Ir. Wks. Co., Sharon, Pa.
- CALCIUM CHLORIDE FOR ROADS**
***Columbia Products Co.**, Barborton, O.
***Dow Chemical Co.**, Midland, Mich.
***Solvay Sales Corp.**, New York
- CANS FOR GARBAGE AND REFUSE**
American Can Co., N. Y.
Durlach Can & Iron Wks., Brooklyn, N. Y.
Reeves Mfg. Co., Denver, Ohio
Rochester Can Co., Rochester, N. Y.
Solar-Sturges Mfg. Co., Melrose, N. J.
Witt Cornice Co., Cincinnati, Ohio
Wyatt Metal & Boiler Wks., Dallas, Tex.
- CANVAS & BURLAP**
Fulton Bag & Cotton Mills, Atlanta, Ga.
- CAR UNLOADERS (See Loaders)**
- CARS, INDUSTRIAL V. DUMPING**
***Insley Mfg. Co.**, Indianapolis, Ind.
***Lakewood Eng. Co.**, Cleveland, Ohio
Atlas Car & Mfg. Co., Cleveland, Ohio
Case Crane & Engg. Co., Columbus, Ohio
Chase Fdry. & Mfg. Co., Columbus, Ohio
Easton Car & Const. Co., Easton, Pa.
C. W. Hunt Co., W. New Brighton, N. Y.
Koppel Ind. Car & Equip. Co., Koppel, Pa.
G. L. Steubner Ir. Wks., Inc., L. I. City, N. Y.
United Ir. Wks., Inc., Kansas City, Mo.
Weller Mfg. Co., Chicago
Whiting Corp., Harvey, Ill.
- CARTS, CONCRETE**
***General Wheelbarrow Co.**, Cleveland, Ohio
***Insley Mfg. Co.**, Indianapolis, Ind.
***Lakewood Co.**, Cleveland, Ohio
***Ransome Conc. Mchv. Co.**, Dunellen, N. J.
***Lansing Co.**, Lansing, Mich.
Acme Road Machy. Co., Frankfort, N. Y.
Acme Crane & Eng. Co., Columbus, O.
Chattanooga Wheelbarrow Co., Chatta., Tenn.
Easton Car & Const. Co., Easton, Pa.
Gray Iron Fdry. Co., Reading, Pa.
Jackson Mfg. Co., Harrisburg, Pa.
Lee Trailer & Body Co., Plymouth, Ind.
Red Star Products Corp., Cleveland
Sterling Wheelbarrow Co., Milwaukee
Toledo Wheelbarrow Co., Toledo, Ohio
- CAST IRON PIPE (See Pipe, Cast Iron)**
- CASTINGS, STEEL**
***Brown Clutch Co.**, Sandusky, Ohio
Farrell-Cheek Steel Fdry. Co., Sandusky, Ohio
Wheeling Mold & Fdry. Co., Wheeling, W. Va.
- CASTINGS, STREET AND SEWER**
***Central Fdry Co. N. Y.**
***U. S. Pipe & Fdry. Co.**, Burlington, N. J.
Canton Fdry. & Mach. Co., Canton, Ohio
H. W. Clark Co., Mattoon, Ill.
Clarksville Fdry. & Mach. Co., Clarksville, Tenn.
J. B. Clow & Sons, Chicago
W. E. Dee Co., Chicago
Donley Bros. Co., Cleveland
Elkhart Fdry. & Mach. Co., Elkhart, Ind.
Int'l. Comb. Eng. Co., Aberdeen, S. Dak.
Klauser Mfg. Co., Dubuque, Iowa
Madison Fdry. Co., Cleveland, Ohio
Niles Machine Co., Lebanon, N. H.
Sessions Foundry Co., Bristol, Conn.
South Bend Fdry. Co., So. Bend, Ind.
- CATCH BASINS (See Castings, Street)**
- CATCH BASIN CLEANING OUTFITS**
Atia Sales Corp., New York
Elgin Corp., N. Y.
Mack Trucks, Inc., N. Y.
- CAULKING COMPOUNDS**
***Servicised Premoulded Products**, Chicago
***Standard Oil Co. of Indiana**, Chicago
Headley Emulsified Prod. Co., Phila.
Texas Co., New York
- CAULKING MACHINERY AND TOOLS**
***Independent Pa. Tool Co.**, Chicago
Helwig Mfg. Co., St. Paul, Minn.
Ingersoll-Rand Co., New York
Mueller Company, Decatur, Ill.
- CEMENT—(P. C. stands for Portland Cement)**
***Columbia Cem. Div. of Pittsburgh Plate Glass Co.**, Pittsburgh, Pa.
***Universal Atlas Cement Co.**, Chicago
Acme Cement Corp., Catskill, N. Y.
Atna P. C. Co., Detroit, Mich.
Allentown P. C. Co., Catasauqua, Pa.
Alpha P. C. Co., Easton, Pa.
Ash Grove Lime & P. C. Co., Kansas City, Mo.
Atlas P. C. Co., N. Y.
Beaver P. C. Co., Portland, Ore.
Bessemer Limestone & C. Co., Youngstown, O.
British Col. Cement Co., Victoria, B. C.
Canada Cement Co., Ltd., Montreal, Canada
Colorado P. C. Co., Denver, Colo.
Consolidated Cement Corp., Chicago
Cowell P. C. Co., Cowell, Cal.
Crescent P. C. Co., Wampum, Pa.
Dewey P. C. Co., Kansas City, Mo.
Diamond P. C. Co., Cleveland, Ohio
Edison P. C. Co., N. Y.
Georgia Cement & Stone Co., Birmingham, Ala.
Giant P. C. Co., Philadelphia, Pa.
Glens Falls P. C. Co., Glens Falls, N. Y.
Golden State P. C. Co., Los Angeles, Cal.
Great West'n. P. C. Co., Kansas City, Mo.
Hawkeye P. C. Co., Des Moines, Iowa
Hercules Cement Corp., Philadelphia
Hermitage P. C. Co., Nashville, Tenn.
Huron P. C. Co., Detroit, Mich.
International Cement Corp., N. Y.
International P. C. Co., Ltd., Spokane, Wash.
Kesmas P. C. Co., Louisville, Ky.
La Tolteca Compania de Cemento Portland, Mexico City, Mex.
Lawrence Cement Co., New York
Lehigh P. C. Co., Allentown, Pa.



Never Before Such a Concrete Cart

HERE'S a Concrete Cart designed—wheels, axles, hopper, every detail—to haul concrete easily, quickly, conveniently, day in and day out for years. That's the General Concrete Cart. Look carefully at the illustration. See the strong pulling loop—you do not have to punch holes in the hopper to tie a chain to it. Hopper is flanged and arc welded. Removable axle housing and the strongest axle ever put in a concrete cart.

Strong beyond any ordinary requirement; designed and perfectly balanced for speed, here is a concrete cart that begins doing a full job the minute you get it and keeps right on doing it. Write for folder giving complete details of our exclusive design and construction.

GENERAL WHEELBARROW COMPANY

Associated Companies:

General Wheelbarrow Company The Empire Plow Company

Headquarters for Wheelbarrows, Concrete Carts, Steel Mortar Boxes, Salamanders, Coal Chutes, Agricultural Implements, Plow Shapes, Scrapers, Road Grader Blades.

3140 East 65th Street

Cleveland, Ohio



Empire ROAD GRADER BLADES

The same specialized strength runs through all General Contractor Equipment and General Highway Equipment. Empire Road Grader Blades, now sold through General distributors, are made of a new special steel which has all the resistance to abrasion of plow steel. They are accurately curved to cut clean and hold their edge. Write for full details.



WHERE TO PURCHASE

CEMENT (Continued)

Louisville Cement Co., Louisville, Ky.
 Manitowoc P. C. Co., Manitowoc, Wis.
 Marlboro Cement Co., Edmonton, Can.
 Marquette Cement Mfg. Co., Chicago
 Mendusa Portland Cement Co., Cleveland, O.
 Missouri P. C. Co., St. Louis, Mo.
 Monarch Cement Co., Humboldt, Kans.
 Monolith P. C. Co., Los Angeles, Cal.
 National Cement Co., Birmingham, Ala.
 Nazareth Cement Co., Nazareth, Pa.
 Nebraska Cement Co., Denver, Colo.
 Newago P. C. Co., Newago, Mich.
 New Egyptian P. C. Co., Detroit
 North Amer. Cement Corp., Albany, N. Y.
 Northwestern States P. C. Co., Mason City, Ia.
 Oklahoma P. C. Co., Denver
 Olympic P. C. Co., Ltd., Seattle
 Oregon P. C. Co., Portland, Ore.
 Pacific P. C. Co., San Francisco
 Peerless P. C. Co., Detroit, Mich.
 Peninsular P. C. Co., Cement City, Mich.
 Penn-Allen Cement Co., Nazareth, Pa.
 Pennsylvania-Dixie Cement Corp., N. Y.
 Petoskey P. C. Co., Petoskey, Mich.
 Phoenix P. C. Co., Philadelphia
 P. C. Co. of Utah, Salt Lake City
 Pyramid P. C. Co., Des Moines
 Riverside P. C. Co., Los Angeles
 St. Marys Cement Co., Toronto, Can.
 San Antonio P. C. Co., San Antonio
 Santa Cruz P. C. Co., San Francisco
 Signal Mountain P. C. Co., Chattanooga, Tenn.
 Southern States P. C. Co., Rockport, Ga.
 Southwestern P. C. Co., Los Angeles, Cal.
 Standard P. C. Co., Cleveland
 Sun P. C. Co., Portland, Ore.
 Superior P. C. Co., Seattle, Wash.
 Three Forks P. C. Co., Denver, Colo.
 Tidewater P. C. Co., Baltimore, Md.
 Trinity P. C. Co., Dallas, Tex.
 Union P. C. Co., Denver, Colo.
 U. S. P. C., Denver, Colo.
 Utah Idaho Cement Co., Ogden, Utah
 Vulcanite P. C. Co., Philadelphia
 Wabash P. C. Co., Detroit
 Warrior Cement Corp., Chattanooga, Tenn.
 Wellston Iron Furnace Co., Jackson, Ohio
 Wolverine P. C. Co., Coldwater, Mich.
 Wyandotte P. C. Co., Detroit

CEMENT BLOCK MACHINES

Abrams Cement Tool Co., Detroit, Mich.
 Cement Block Machy. Co., Newark, N. J.
 J. B. Foote Fdry. Co., Fredericktown, O.
 Engelmeier Cast Stone Block Machy. Co., Bay City, Mich.

CEMENT INSPECTION (See Inspecting Laboratories)

CEMENT TOOLS

Abrams Cement Tool Co., Detroit
 American Fork & Hoe Co., Cleveland

CENTRIFUGAL PUMPS (See Pumps, Centrifugal)

CHAINS

*Chain Belt Co., Milwaukee, Wis.
 Amer. Chain Co., Inc., Bridgeport, Conn.
 Baldwin Chain & Mfg. Co., Worcester, Mass.
 Columbus McKinnon Chain Corp., Tonawanda, N. Y.
 Diamond Chain & Mfg. Co., Indianapolis, Ind.
 Jeffrey Mfg. Co., Columbus, Ohio
 Link-Belt Co., Chicago
 U. S. Chain & Forge Co., Pittsburgh, Pa.
 Webster Mfg. Co., Chicago
 Weller Mfg. Co., Chicago

CHIMNEYS, CONCRETE

Heine Chimney Co., Chicago
 H. R. Heinicke, Inc., Indianapolis, Ind.
 Rust Engineering Co., Chicago
 Weber Chimney Co., Chicago

CHIMNEYS, RADIAL BRICK

Amer. Chimney Corp., N. Y.
 Continental Chimney Co. of Chicago, Chicago
 Alphona Custodia Chimney Const. Co., N. Y.
 Heine Chimney Co., Chicago
 H. R. Heinicke, Inc., Indianapolis, Ind.
 M. W. Kellogg & Co., N. Y.
 Rust Engineering Co., Pittsburgh, Pa.

CHIMNEYS, STEEL (See Stacks, Steel)

CHISELS, CHIPPING

Cleveland Steel Tool Co., Cleveland, Ohio
 Verona Tool Wks., Verona, Pa.

CHLORINATORS

*Wallace & Tiernan Co., Inc., Newark, N. J.
 Paradon Mfg. Co., Arlington, N. J.

CHLORINE, LIQUID (See Liquid Chlorine)

CHUTES, CONCRETE

*Insley Mfg. Co., Indianapolis, Ind.
 *Lakewood Eng. Co., Cleveland, Ohio
 *Ransome Conc. Mch. Co., Dunellen, N. J.
 Archer Iron Works, Chicago

CLAMP & TIES, FORM

*Insley Mfg. Co., Indianapolis
 American Form-Hold Corp., Culver City, Cal.
 Batavia Clamp Co., Batavia, N. Y.
 Black Bros. Co., Mendota, Ill.
 Concrete Form Tie Corp., Pittsburgh, Pa.
 Day-Set Wall Tie Co., Dayton, O.
 W. A. Kuhlman & Co., Toledo
 M. & M. Wire Clamp Co., Minneapolis
 James L. Taylor Mfg. Co., Poughkeepsie, N. Y.
 Universal Form Clamp Co., Chicago
 Wedgit Tie Co., Inc., New York

CLAMPS, COLUMN

*Ellis & Ford Mfg. Co., Detroit, Mich.
 *Insley Mfg. Co., Indianapolis, Ind.
 Black Bros. Co., Mendota, Ill.
 Concrete Eng. Co., Omaha, Neb.
 Handy Mfg. Co., Chicago
 Kardong Bros., Inc., Minneapolis
 W. A. Kuhlman & Co., Toledo, Ohio
 M. & M. Wire Clamp Co., Minneapolis
 The O. D. G. Co., Owensboro, Ky.
 J. E. Porter Corp., Ottawa, Ill.
 H. W. Roos Co., Cincinnati
 Steelform Contracting Co., San Francisco
 Sterling Wheelbarrow Co., Milwaukee
 Symons Clamp & Mfg. Co., Chicago
 James L. Taylor Mfg. Co., Poughkeepsie, N. Y.
 Universal Form Clamp Co., Chicago
 Wedgit Tie Co., Inc., New York

CLAY DIGGERS, PNEUMATIC

*Independent Pn. Tool Co., Chicago
 Buckeye Traction Ditcher Co., Findlay, O.
 Chicago Pneumatic Tool Co., New York
 Cleveland Rock Drill Co., Cleveland
 Gardner-Denver Co., Quincy, Ill.
 Ingersoll-Rand Co., New York
 Schramm, Inc., West Chester, Pa.
 Sullivan Machy. Corp., Chicago

CLAY PIPE

(See Pipe, Vitrified Clay)

CLIPS, WIRE ROPE

*Amer. Steel & Wire Co., Chicago
 Amer. Hoist & Derrick Co., St. Paul, Minn.
 Fischer & Hayes Rope & Steel Co., Chicago
 Hazard Wire Rope Co., Wilkes-Barre, Pa.
 Thos. Laughlin Co., Portland, Mo.
 Marion Malleable Iron Wks., Marion, Ind.
 C. M. Mockbee Co., Cincinnati, Ohio
 John A. Roebling Sons Co., Trenton, N. J.
 Upson-Walton Co., Cleveland, Ohio

CLUTCHES

*Brown Clutch Co., Sandusky, Ohio
 *O. K. Clutch & Machy. Co., Columbia, Pa.
 *Twin Disc Clutch Co., Racine, Wis.
 *Waukesha Motor Co., Waukesha, Wis.
 Brown-Line Gear Co., Syracuse, N. Y.
 Link-Belt Co., Chicago
 Pioneer Gravel Eq. Mfg. Co., Minneapolis

COCKS, CURB AND CORPORATION

Chapman Valve Mfg. Co., Indian Orchard, Mass.
 Glauber Brass Mfg. Co., Cleveland, Ohio
 Haydenville Co., Haydenville, Mass.
 Hays Mfg. Co., Erie, Pa.
 Mueller Co., Decatur, Ill.
 Union Water Meter Co., Worcester, Mass.

COMPRESSORS, AIR (See Air Compressors)

CONCRETE BLOCK MACHINES (See Cement Block Machines)

CONCRETE BREAKERS (See Breakers, Concrete)

CONCRETE CURING

*Acqua-Proof, Inc., New York
 *Columbia Frod. Co., Barborton, O.
 *Dow Chemical Co., Midland, Mich.
 *McEverlast, Inc., Los Angeles, Calif.
 *Solvay Sales Corp., New York
 Barber Asphalt Co., Philadelphia

CONCRETE HEATERS

*Chausse Oil Burner Co., Elkhart, Ind.
 *Connery & Co., Philadelphia, Pa.
 *Littleford Bros., Cincinnati
 Aeroll Burner Co., West New York, N. J.
 Hauck Mfg. Co., Brooklyn, N. Y.

CONCRETE MIXERS

*Chain Belt Co., Milwaukee, Wis.
 *Jaeger Mach. Co., Columbus, Ohio
 *Kochring Co., Milwaukee, Wis.
 *Kwik-Mix Concrete Mixer Co., Fort Washington, Wis.
 *Lakewood Eng. Co., Cleveland, Ohio

*Lansing Co., Lansing, Mich.
 *John Lauson Mfg. Co., New Holstein, Wis.
 *Ransome Con. Mch. Co., Dunellen, N. J.
 *Republic Iron Wks., Tecumseh, Mich.
 *T. L. Smith Co., Milwaukee
 Acme Rd. Machy. Co., Frankford, N. Y.
 Amer. Cem. Mch. Co., Inc., Keokuk, Iowa
 Anchor Mfg. Co., Chicago
 Archer Iron Works, Chicago
 Atlas Engineering Co., Clintonville, Wis.
 Badger Con. Mixer Co., Milwaukee
 Construction Mch. Co., Waterloo, Iowa
 Norris K. Davis, San Francisco, Calif.
 J. B. Foote Fdry. Co., Fredericktown, Ohio
 Gray Iron Fdry. Co., Reading, Pa.
 Judy Mfg. Co., Centerville, Iowa
 Knickerbocker Co., Jackson, Mich.
 Leach Co., Oshkosh, Wis.
 Orr & Sembower, Reading, Pa.
 Remmell Mfg. Co., Kewaskum, Wis.

CONCRETE PAVERS (See Pavers, Concrete)

CONCRETE PILING (See Piling)

CONCRETE PIPE (See Pipe, Concrete)

CONCRETE PLACERS, PNEUMATIC

*Ransome Concrete Machy. Co., Dunellen, N. J.

CONCRETE REINFORCEMENT

*American Steel & Wire Co., Chicago
 *Truscon Steel Co., Youngstown, Ohio
 Bethlehem Steel Co., Bethlehem, Pa.
 Carnegie Steel Co., Pittsburgh, Pa.
 Concrete Steel Co., N. Y.
 Consolidated Exp. Metal Co., Wheeling, W. Va.
 Electric Welding Co., Pittsburgh, Pa.
 Ft. Pitt Bridge Works, Pittsburgh, Pa.
 Genfire Steel Co., Youngstown, Ohio
 Inland Steel Co., Chicago
 Kalman Steel Co., Chicago
 Laclede Steel Co., St. Louis, Mo.
 National Steel Fabric Co., Pittsburgh
 Republic Iron & Steel Co., Youngstown, Ohio
 J. T. Ryerson & Son, Chicago
 Sweet's Steel Co., Williamsport, Pa.
 Wickwire-Spencer Steel Co., N. Y.

CONCRETE ROAD FINISHERS

*Blaw-Knox Co., Pittsburgh, Pa.
 *A. W. French & Co., Chicago
 *Lakewood Eng. Co., Cleveland, Ohio

CONDENSERS

*Allis-Chalmers Mfg. Co., Milwaukee
 Ingersoll-Rand Co., N. Y.
 Sangamo Elec. Co., Springfield, Ill.
 Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.
 Worthington Pump & Machy. Corp., N. Y.
 Young Radiator Co., Racine, Wis.

CONDUITS, UNDERGROUND

Amer. Vittr. Products Co., Akron, Ohio
 Johns-Manville, Inc., N. Y.
 National Fireproofing Co., N. Y.
 Pennacola Creosoting Co., Pennacola, Fla.
 Ric-wil. Co., Cleveland
 Wyckoff Pipe & Creosoting Co., New York

CONTRACTORS' EQUIPMENT DEALERS (See Pages 123 to 150)

CONVEYORS, BELT

*Austin-Western Rd. Mch. Co., Chicago
 *Barber-Greene Co., Aurora, Ill.
 *The Burch Corp., Crestline, Ohio
 *Chain Belt Co., Milwaukee, Wis.
 *Chicago Automatic Conv. Co., Chicago
 *Conveying Weigher Co., New York
 *Good Rds. Mch. Co., Kennett Sq., Pa.
 *Jos. Honhorst Co., Cincinnati
 *Industrial Brownhoist Corp., Cleveland
 Atlas Engineering Co., Clintonville, Wis.
 C. O. Bartlett & Snow Co., Cleveland
 H. W. Caldwell & Son, Chicago
 Cincinnati Rubber Mfg. Co., Cincinnati
 Cyclone Fence Co., Waukegan, Ill.
 Fairchild Engineering Co., Marion, Ohio
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Gifford-Wood Co., Hudson, N. Y.
 Godfrey Conveyor Co., Elkhart, Ind.
 Geo. Hains Mfg. Co., New York
 Iowa Mfg. Co., Cedar Rapids, Ia.
 Jeffrey Mfg. Co., Columbus, Ohio
 Lamson Co., Syracuse, N. Y.
 Link-Belt Co., Chicago
 New Holland Mach. Co., N. Holland, Pa.
 Northern Conveyor Co., Janesville, Wis.
 Samuel Olson & Co., Chicago
 Pioneer Gravel Eq. Mfg. Co., Minneapolis
 Portable Machinery Co., Olifton, N. J.
 Robins Conv. Belt Co., N. Y.
 Jas. B. Seavers Co., Batavia, Ill.
 Smith Eng. Wks., Milwaukee
 Standard Conv. Co., No. St. Paul, Minn.



"UNIT COSTS LESS

than on similar job done last summer without CALCIUM CHLORIDE," says contractor . . .

In an article in *Municipal Improvements*, Mr. A. C. Hammond, district manager for Parklap, Inc., makes the following statements regarding the use of Calcium Chloride in the construction of the Montreal Rail and Water Terminal.

"The job was a winter job and it was necessary to pour concrete without interruption all through the winter.

"No concrete was frozen. Progress was made at the rate of one floor every eight days. Unit costs of the work have been less than the unit costs on a similar job performed last summer provided the cost of winter weather protection is disregarded."

In a letter on the same subject Mr. Hammond also states,

"The value of Calcium Chloride is two-fold. It increases the speed of setting and delays the time of freezing. The saving effected by using Calcium Chloride consists of less time of cement finishers, less amount of canvas necessary, less time for burning coke in the salamanders, and earlier completion of the work, and more important than these—the lower cost of forms, steel and concrete on account of the earlier stripping. It decreases the time lost between the different operations and increases the efficiency of the cement."

Why not give your construction work the advantages of the use of Calcium Chloride?

Write today for booklet 443.

CALCIUM CHLORIDE PUBLICITY COMMITTEE

THE DOW CHEMICAL CO. . . . Midland, Michigan
THE COLUMBIA PRODUCTS CO. . . . Barberton, Ohio
SOLVAY SALES CORP. . . . 61 Broadway, New York

CALCIUM CHLORIDE

CURES CONCRETE

WHERE TO PURCHASE

CONVEYORS, BELT—(Continued)

Stephens-Adams Mfg. Co., Aurora, Ill.
Universal Crusher Co., Cedar Rapids, Iowa
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

CONVEYORS, BUCKET

*Chain Belt Co., Milwaukee, Wis.
*Chicago Automatic Conv. Co., Chicago
*Conveying Weigher Co., N. Y.
*Good Roads Mch. Co., Kennett Sq., Pa.
*Jos. Honhorst Co., Cincinnati, Ohio
*Industrial Brownhoist Corp., Cleveland
Atlas Engineering Co., Clintonville, Wis.
C. O. Bartlett & Snow Co., Cleveland, Ohio
H. W. Caldwell & Son, Chicago
Fairfield Engineering Co., Marion, Ohio
Gifford-Wood Co., Hudson, N. Y.
Godfrey Conv. Co., Elkhart, Ind.
Guarantee Constn. Co., N. Y.
Geo. Haisa Mfg. Co., New York
Iowa Mfg. Co., Cedar Rapids, Ia.
Jeffrey Mfg. Co., Columbus, Ohio
Lamson Co., Syracuse, N. Y.
Link-Belt Co., Chicago
Mead-Morrison Mfg. Co., E. Boston, Mass.
New England Road Machy. Co., So. Boston
New Holland Mach. Co., N. Holland, Pa.
Pioneer Gravel Eq. Mfg. Co., Minneapolis
Republic Rubber Co., Youngstown, Ohio
Jas. B. Seaverns Co., Batavia, Ill.
Stephens Adams Mfg. Co., Aurora, Ill.
Universal Crusher Co., Cedar Rapids, Iowa
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

CONVEYORS, GRAVITY

Lamson Co., Syracuse, N. Y.
Logan Co., Louisville, Ky.
Mathews Conveyor Co., Elwood City, Pa.
Samuel Olson & Co., Chicago
Standard Conv. Co., No. St. Paul, Minn.

COUPLINGS, HOSE, AIR AND WATER

*O. B. Hunt & Son, Salem, O.
*Independent Pneumatic Tool Co., Chicago
Cleveland Pneum. Tool Co., Cleveland, Ohio
Gilman Mfg. Co., East Boston, Mass.
Godfrey Conveyor Co., Elkhart, Ind.
Ingersoll-Rand Co., N. Y.
W. H. Keller, Inc., Grand Haven, Mich.
Muleconroy Co., Philadelphia

CRANES, CRAWLER

*Bay City Shovel, Inc., Bay City, Mich.
*Industrial Brownhoist Corp., Cleveland
*Manitowoc Engr. Works, Manitowoc, Wis.
*Osgood Company, Marion, Ohio
*Trackson Co., Milwaukee
*Universal Crane Co., Lorain, Ohio
*W-K-M Co., Houston, Tex.
Browning Crane Co., Cleveland
Buckeye Traction Ditcher Co., Findlay, O.
Bucyrus-Erie Co., So. Milwaukee, Wis.
Byers Mach. Co., Havana, O.
General Excavator Co., Marion, Ohio
Link-Belt Co., Chicago
McMyler Interstate Co., Cleveland
Mead-Morrison Mfg. Co., E. Boston
Northwest Eng. Co., Chicago
Ohio Loc. Crane Co., Bucyrus, Ohio
Ohio Power Shovel Co., Lima, O.
Orion Crane & Shovel Co., Chicago
Otis Eng. Co., Brooklyn, N. Y.
Star Drilling Mach. Co., Akron, Ohio
Sterling Tractor Equipment Co., New York
Thew Shovel Co., Lorain, Ohio

CRANES, LOCOMOTIVE

*Industrial Brownhoist Corp., Cleveland
*Koeberling Co., Milwaukee
*Osgood Company, Marion, Ohio
*Parsons Co., Newton, Iowa
*Speeder Mch. Corp., Cedar Rapids, Iowa
Amer. Hst. & Derrick Co., St. Paul, Minn.
Browning Crane Co., Cleveland, Ohio
Bucyrus-Erie Co., So. Milwaukee, Wis.
Link-Belt Co., Chicago
Loc. Crane Co. of Amer., Champaign, Ill.
McMyler Interstate Co., Cleveland, Ohio
Northwest Eng. Co., Chicago
Ohio Loc. Crane Co., Bucyrus, Ohio
Orion Crane & Shovel Co., Chicago
Thew Shovel Co., Lorain, Ohio

CRANES, ONE-TON

Clark Tractor Co., Battle Creek, Mich.
Hughes-Keenan Co., Mansfield, Ohio
Whitehead & Kales Co., Detroit, Mich.

CRANES, OVERHEAD TRAVELING

Alliance Mach. Co., Alliance, O.
Chesapeake Iron Wks., Baltimore, Md.
Chisholm-Moore Holst Corp., Tonawanda, N. Y.
Curtis P. Mch. Co., St. Louis
Erie Steel Const. Co., Erie, Pa.
Harnischfeger Corp., Milwaukee, Wis.
Milwaukee Elec. Crane Co., Milwaukee
Morgan Eng. Co., Alliance, O.
Northern Eng. Wks., Detroit, Mich.
Shaw Crane Wks., Muskegon, Mich.
Shepard Elec. Cr. & Hst. Co., Montour Falls, N. Y.
Toledo Crane Co., Bucyrus, O.
Whiting Corp., Harvey, Ill.

CRANES, TRUCK

*Universal Crane Co., Lorain, Ohio
Atlas Sales Corp., New York
Bay City Fdry. & Mach. Co., Bay City, Mich.
Browning Crane Co., Cleveland
Ersted Mfg. Co., Portland, Ore.
Harnischfeger Corp., Milwaukee, Wis.
Orton Crane & Shovel Co., Chicago

CRANES, WRECKING

*Industrial Brownhoist Corp., Cleveland
Bucyrus-Erie Co., So. Milwaukee, Wis.
Industrial Wks., Bay City, Mich.

CRAWLER ATTACHMENTS

*W. A. Riddell Co., Bucyrus, O.
*Trackson Co., Milwaukee, Wis.
Belle City Mfg. Co., Racine, Wis.
Geo. Haisa Mfg. Co., New York
Link-Belt Co., Chicago

CREOSOTED BLOCKS, TIMBER, ETC.

Amer. Creos. Co., Inc., Louisville, Ky.
Amer. Creos. Wks., Inc., New Orleans, La.
Ayer & Lord Tie Co., Chicago
Carier Bloxond Flooring Co., K. City, Mo.
Colonial Cre. Co., Inc., Louisville, Ky.
Compressed Wood Preserv. Co., Cincinnati, O.
Creos. Materials Co., New Orleans, La.
Georgia Creos. Co., Louisville, Ky.
Jennison-Wright Co., Toledo, O.
Long Bell Lumber Co., Kansas City, Mo.
Midland Creos. Co., Granite City, Ill.
Pensacola Creosoting Co., Pensacola, Fla.
Republic Creos. Co., Indianapolis, Ind.
Southern Wood Pres. Co., Atlanta, Ga.
Wyckoff Pipe & Creos. Co., N. Y.

CRUSHERS, ROCK

*Allis-Chalmers Mfg. Co., Springfield, Ill.
*Austin-Western Rd. Mach. Co., Chicago
*Good Rds. Mch. Co., Kennett Sq., Pa.
*Western Wheelabrator Corp., Aurora, Ill.
*W-K-M Co., Houston, Tex.
Acme Rd. Machy. Co., Frankfort, N. Y.
Gallion Ir. Wks. & Mfg. Co., Gallion, O.
Iowa Mfg. Co., Cedar Rapids, Ia.
New England Road Machy. Co., So. Boston
New Holland Mach. Co., New Holland, Pa.
Pioneer Gravel Eq. Mfg. Co., Minneapolis
Russell Grader Mfg. Co., Minneapolis
Smith Eng. Works, Milwaukee
Sturtevant Mill Co., Boston
Universal Crusher Co., Cedar Rapids, Ia.
Universal Rd. Machy. Co., Kingston, N. Y.
Wheeling Mold & Fdry. Co., Wheeling, W. Va.

CULVERTS, CAST IRON

*U. S. Pipe & Fdry. Co., Burlington, N. J.
American Casting Co., Birmingham, Ala.
Beach Mfg. Co., Charlotte, Mich.
Gallion Iron Wks. & Mfg. Co., Gallion, O.
R. D. Wood & Co., Philadelphia

CULVERTS, CORRUGATED METAL

*Armco Culvert Mfrs. Assn., Middletown, O.
*Austin-Western Rd. Mach. Co., Chicago
*Gohi Culvert Mfrs., Inc., Newport, Ky.
*Good Rds. Mach. Co., Kennett Sq., Pa.
American Casting Co., Birmingham, Ala.
Bark River Bridge & Culv. Co., Bark River, Mich.
Beach Mfg. Co., Charlotte, Mich.
Beatrice Steel Tank Mfg. Co., Beatrice, Neb.
Berger Mfg. Co., Jacksonville, Fla.
Boardman Co., Okla. City, Okla.
Burnham Mfg. Co., Woods Creek, Utah
Calif. Corr. Culv. Co., W. Berkeley, Cal.
Canada Ingot Ir. Co., Ltd., Guelph, Ont.
Canton Culv. & Silo Co., Canton, O.
Central Culvert Co., Ottumwa, Iowa
Capital City Culvert Co., Madison, Wis.
Decatur Corncor & Roofing Co., Albany, Ala.
Denver Steel & Iron Wks. Co., Denver, Colo.
Dixie Culv. & Metal Co., Atlanta, Ga.
Dixie Culv. Mfg. Co., Little Rock, Ark.
A. N. Eaton Metal Prod. Co., Omaha, Neb.
Edwards Mfg. Co., Cincinnati
Feensaughty Mach'y Co., Portland, Ore.
Gallion Iron Wks. & Mfg. Co., Gallion, O.
Gilbert Mfg. Co., Stillwater, Minn.
H. Hardesty Mfg. Co., Denver, Colo.
Highway Prod. & Mfg. Co., Elmira, N. Y.
Ind. Corr. Culv. Co., Mason City, Ia.
Iowa Pure Ir. Co., Des Moines, Ia.
Kentucky Culvert Mfg. Co., Louisville, Ky.
Klauer Mfg. Co., Dubuque, Ia.
Lincoln Steel & Forge Co., St. Louis
Lyle Culv. & Pipe Co., Minneapolis
Md. Culv. & Metal Co., Baltimore
Missouri Pure Iron Co., Moberly, Mo.
Nebraska Culv. & Mfg. Co., Wahoo, Neb.
N. E. Metal Culv. Co., Palmer, Mass.
N. E. Metal Culvert Co., Nashua, N. H.
Newport Culvert Co., Newport, Ky.
Northfield Ir. Co., Northfield, Minn.
Northwest'n Sheet & Ir. Wks., Wahpeton, N. D.
Ohio Corr. Culv. Co., Middletown, O.
W. Q. O'Neill Co., Crawfordsville, Ind.
Penn Metal Co., Boston
Pennsylvania Culv. Co., Philadelphia, Pa.
Pure Iron Culvert & Mfg. Co., Portland, Ore.

Road Supply & Metal Co., Topeka, Kan.
Roanoke Sales Corp., Roanoke, Va.
St. Paul Corr. Co., St. Paul, Minn.
Sioux Falls Metal Culv. Co., Sioux Falls, S. D.
So. Metal Culv. Co., Salisbury, N. C.
Spokane Culv. & Tank Co., Spokane, Wash.
Tenn. Metal Culv. Co., Nashville
Tennison Brothers, Oklahoma City, Okla.
Tennison Brothers, Texarkana, Ark.
Union Iron Prod. Co., E. Chicago, Ind.
U. S. Br. & Culv. Co., Bay City, Mich.
Virginia Culvert Corp., Richmond, Va.
Western Metal Mfg. Co., Houston, Tex.
Wheeling Corr. Co., Wheeling, W. Va.
Wyatt Metal & Blr. Wks., Dallas, Tex.

CULVERT FORMS

*Blaw-Knox Company, Pittsburgh, Pa.
Concrete Form Co., Inc., Watertown, N. Y.
Northfield Iron Co., Northfield, Minn.

CURB BOXES

*Central Foundry Co., New York
H. W. Clark Co., Mattoon, Ill.
J. B. Clow & Son, Chicago
Columbian Iron Wks., Chattanooga, Tenn.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Madison Fdry Co., Cleveland, O.
Mueller Co., Decatur, Ill.
J. S. Schofield's Sons Co., Macon, Ga.
R. D. Wood & Co., Philadelphia, Pa.

CURB, GUTTER AND BASE FORMS (See Forms, Concrete)

CURB GUARDS, STEEL

W. S. Godwin Co., Baltimore

CURB, STEEL PROTECTED

*Truscon Steel Co., Youngstown, O.
Concrete Steel Co., N. Y.

CURING OF CONCRETE

*Acqua-Proof, Inc., New York
*Columbia Prod. Co., Barberton, O.
*Dow Chemical Co., Midland, Mich.
*McEverest, Inc., Los Angeles, Calif.
*Solvay Sales Corp., N. Y.
Barber Asphalt Co., Philadelphia

CUTTERS, PIPE, HAND

*Ellis & Ford Mfg. Co., Detroit
Armstrong Mfg. Co., Bridgeport, Conn.
Barnes Tool Co., New Haven, Conn.
Erie Tool Works, Erie, Pa.
Greenfield Tap & Die Corp., Greenfield, Mass.
Oswego Tool Co., Oswego, N. Y.
Reed Mfg. Co., Erie, Pa.
Walworth Co., Boston

CUTTERS, ROD AND WIRE

*Koeberling Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Carolina Mfg. Co., Sterling, Ill.
Helwig Mfg. Co., St. Paul, Minn.
M. & M. Wire Clamp Co., Minneapolis
Morse-Starratt Prod. Co., Oakland, Calif.

CUTTING EDGES

*Caterpillar Tractor Co., San Leandro, Cal.
*General Wheelbarrow Co., Cleveland
J. D. Adams Co., Indianapolis, Ind.
Shunk Mfg. Co., Bucyrus, O.

CUTTING AND WELDING APPARATUS (See Welding Apparatus)

CYLINDER HEADS, RICARDO

*Waukesha Motor Co., Waukesha, Wis.

DERRICKS, GUY AND STIFFLE

*Clyde Ir. Wks. Sales Co., Duluth, Minn.
*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*S. Flory Mfg. Co., Bangor, Pa.
*Insley Mfg. Co., Indianapolis, Ind.
*J. S. Mundy Htg. Engine Co., Newark, N. J.
*Sasgen Derrick Co., Chicago
*Street Bros. Mach. Works, Chattanooga
Amer. Hst. & Derrick Co., St. Paul, Minn.
Superior Iron Wks., Superior, Wis.

DERRICKS, PIPE LAYING

*Dobbie Fdry. & Mach. Co., Niagara Falls, N. Y.
*Sasgen Derrick Co., Chicago
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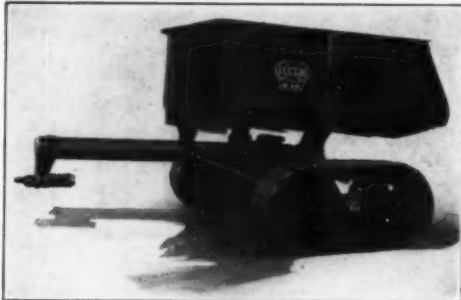
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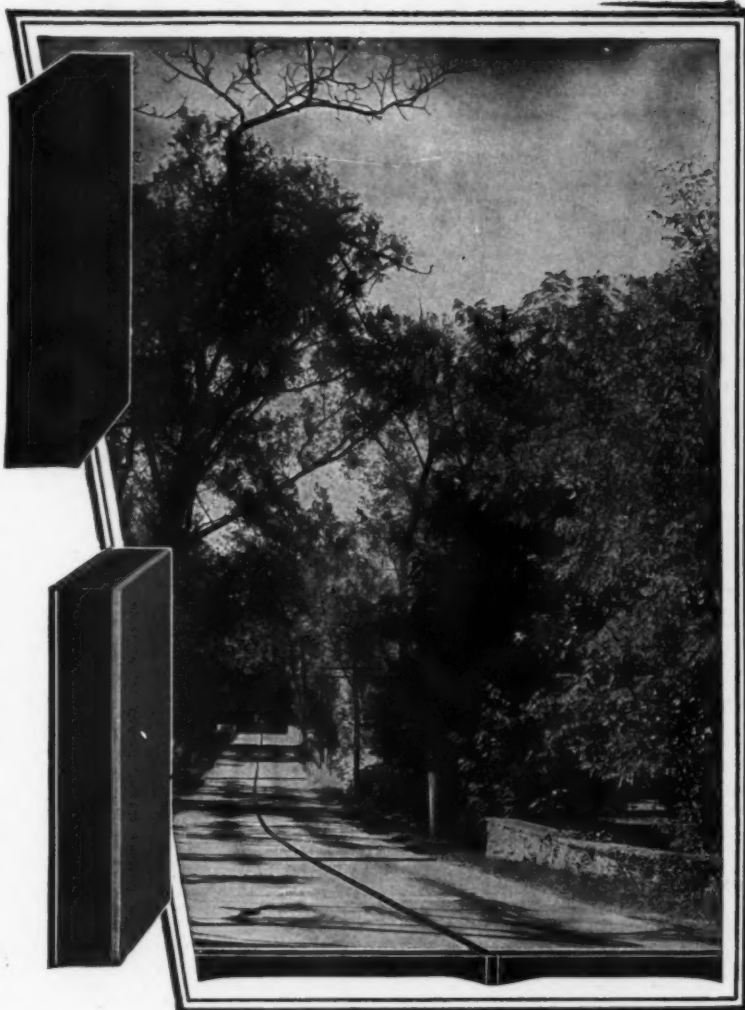
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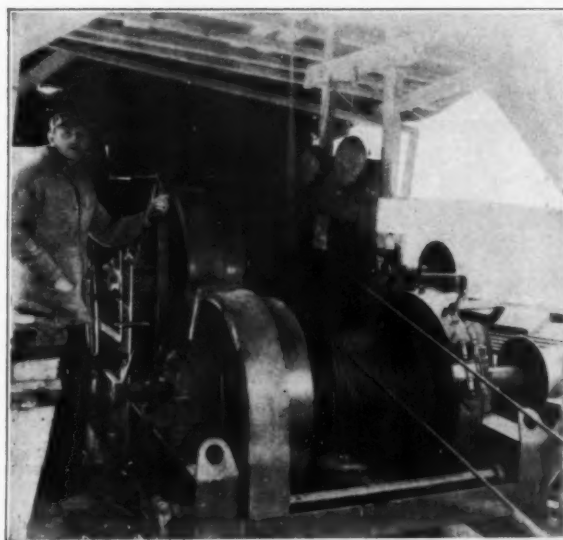
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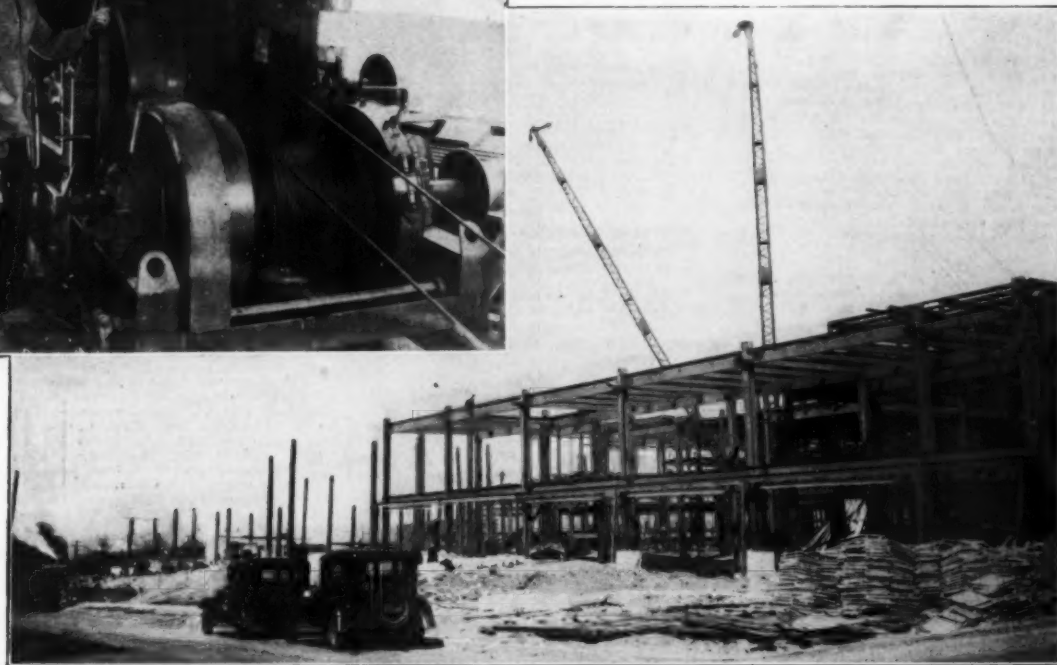
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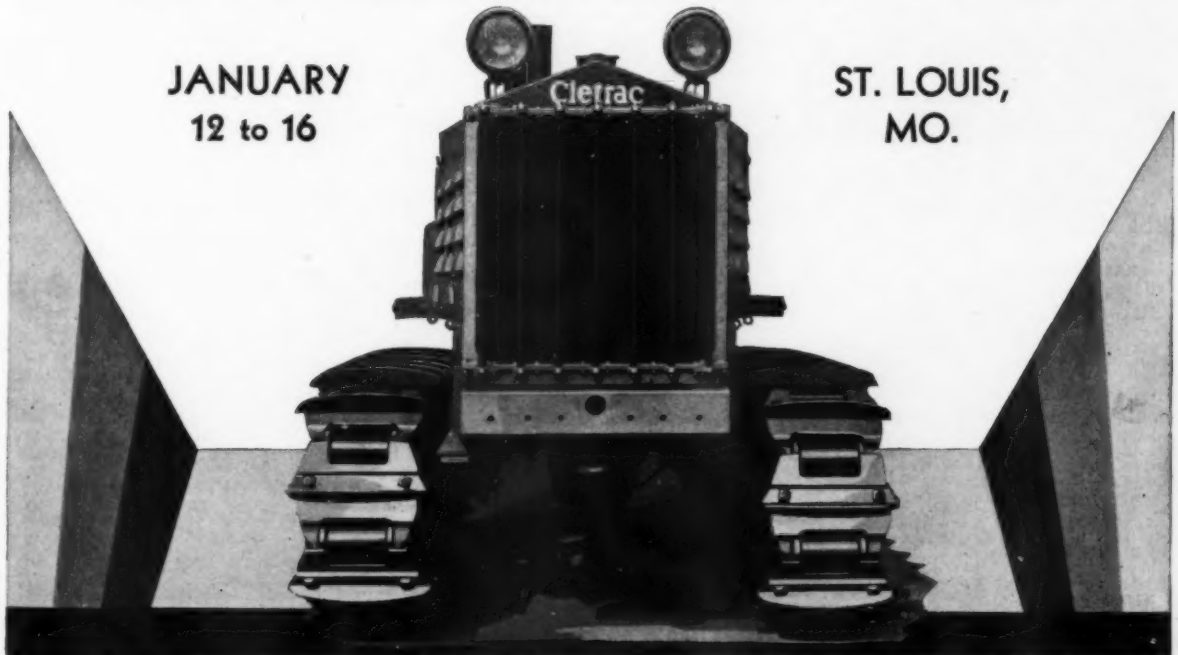
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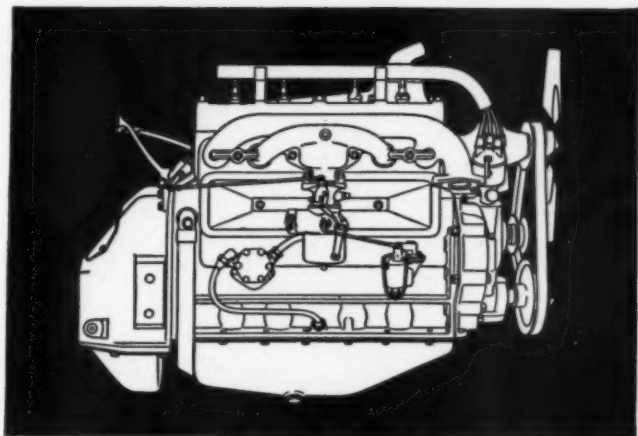
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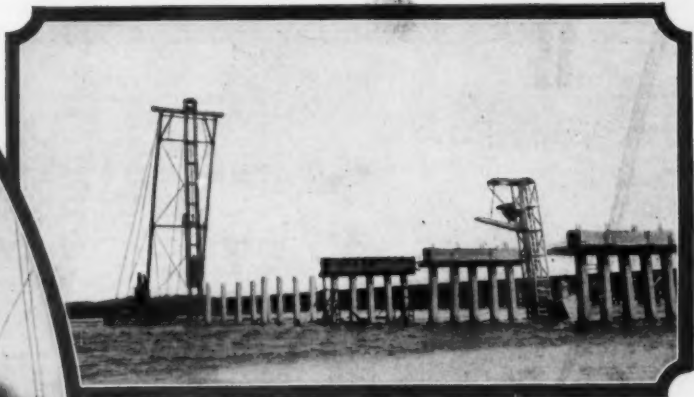
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*Joseph Hornhorst Co., Cincinnati, Ohio
*Littleford Bros., Cincinnati, Ohio
Jackson Mfg. Co., Harrisburg
- SAFETY TREADS** (See Treads, Safety)
- SASH ROLLER STEEL** (See Window Frames and Sash)
- SAW HORSES**
Cleveland Steel Specialty Corp., Cleveland, O.
- SAW MILLS & ACCESSORIES**
*American Saw Mill Machy. Co., Hackettstown, N. J.
- SAW RIGS, PORTABLE**
*American Saw Mill Machy. Co., Hackettstown, N. J.
*C. H. & E. Mfg. Co., Milwaukee
*John Lauson Mfg. Co., New Holstein, Wis.
De Walt Products Co., Leola, Pa.
Jones Superior Machine Co., Chicago
Knickerbocker Co., Jackson, Mich.
Leach Co., Oshkosh, Wis.
Witte Engine Works, Kansas City, Mo.
- SAWS, PORTABLE POWER**
*Reed-Prentice Corp., Worcester, Mass.
*Tousley Tool Co., Cedar Rapids, Iowa
Ingersoll-Rand Co., New York
Michel Electric Hand Saw Co., Chicago
Portable Power Tool Corp., Warsaw, Ind.
Porter Cable Machinery Co., Syracuse
F. L. Rogers & Co., Chicago
Skilaw, Inc., Chicago, Ill.
Speedway Mfg. Co., Cicero, Ill.
Wappat Gear Works, Pittsburgh, Pa.
Witte Engine Works, Kansas City, Mo.
- SCAFFOLDING, STEEL, ADJUSTABLE**
*Toledo Pressed Steel Co., Toledo, Ohio
- SCARIFIERS**
*Austin-Western Road Machy. Co., Chicago
*Baker Mfg. Co., Springfield, Ill.
*Buffalo-Springfield Roller, Springfield, O.
*Caterpillar Tractor Co., San Leandro, Cal.
*Huber Mfg. Co., Marion, Ohio
*Chas. Hvass & Co., New York
*W. A. Riddell Co., Bucyrus, O.
*Rome Mfg. Co., Rome, N. Y.
*Wiard Flow Co., Batavia, N. Y.
Acme Road Machinery Co., Frankfort, N. Y.
Banting Mfg. Co., Toledo, Ohio
Galion Iron Works & Mfg. Co., Gallion, O.
Gilbert Mfg. Co., Stillwater, Minn.
Killefer Mfg. Corp., Los Angeles
Ryan Mfg. Corp., Chicago
Shaw-Enochs Tractor Co., Minneapolis
Universal Road Machy. Co., Kingston, N. Y.
- SCARIFIERS, TEETH FOR**
*Caterpillar Tractor Co., San Leandro, Calif.
Galion Iron Works & Mfg. Co., Gallion, O.
Shunk Mfg. Co., Bucyrus, Ohio
- SCOOPS, HORSE OR TRACTOR DRAWN**
(See Scrapers, Drag, Scrapers, Rotary and Scrapers, Wheeled)
- SCOOPS, HAND** (See Shovels, Spades and Scoops)
- SCOOPS, SKIMMER AND TRENCH**
*Bay City Shovels, Inc., Bay City, Mich.
Keystone Driller Co., Beaver Falls, Pa.
- SCRAPERS, FRESNO** (See Scrapers, Rotary)
- SCRAPERS, DRAGLINE**
*Sauerman Bros., Chicago
*Western Wheeled Scraper Co., Aurora, Ill.
American Manganese Steel Co., Chicago Heights, Ill.
Beach Mfg. Co., Charlotte, Mich.
Browning Crane Co., Cleveland
Bucyrus-Erie Co., So. Milwaukee, Wis.
Garst Mfg. Company, Chicago
Godfrey Conveyor Co., Elkhart, Ind.
Harnischfeger Corp., Milwaukee
Link-Belt Co., Chicago
Monighan Machine Co., Chicago
Page Engineering Co., Chicago
Pioneer Gravel Eq. Mfg. Co., Minneapolis

If you find any errors or omissions in this Where to Purchase list, please send corrections to CONTRACTORS AND ENGINEERS MONTHLY



This
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Making Sure is the very fundamental rule among careful workmen.

Nearly every industry of any importance has "safety engineers"—men employed to study and put into practice methods for the protection of workmen.

If you are one who is interested in protecting your co-workers and not using "Williamsport" wire rope—may we ask you: "How do you *make sure* of getting the grade or tensile strength of rope you order? Do you accept the marking on the reel, or tag and let it go at that or do you make a laboratory test?"

A Telfax Tape is woven into Williamsport wire ropes to give you definite facts as to the grade of steel used in its manufacture. It cannot be removed, and if it changes reels the Telfax Tape goes with the rope. This is not always true with a tag.

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WILLIAMSPORT WIRE ROPE CO.

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General Sales Offices
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• • • • WHERE TO PURCHASE • • • •

SCRAPERS, POWER DRAG

*Highway Trailer Co., Edgerton, Wis.
 *Sauerman Bros., Chicago
 *Schofield-Burkett Constr. Co., Macon, Ga.
 Beach Mfg. Co., Charlotte, Mich.
 Beaumont Mfg. Co., Philadelphia
 Garst Mfg. Co., Chicago
 L. F. Green, Chicago
 Godfrey Conveyor Co., Elkhart, Ind.
 Link-Belt Co., Chicago
 Shaw Exc. & Tools Co., Worthington, O.

SCRAPERS, ROAD (See also Drags, Road)

*Austin-Western Rd. Machy. Co., Chicago
 *Rome Mfg. Co., Rome, N. Y.
 Root Spring Scraper Co., Kalamazoo, Mich.

SCRAPERS, ROTARY

*Austin-Western Road Machinery Co., Chicago
 *Baker Mfg. Co., Springfield, Ill.
 *Euclid Crane & Hoist Co., Euclid Village, O.
 *General Wheelbarrow Co., Cleveland
 *Roderick Lean Co., Mansfield, Ohio
 *Gustav Schaefer Co., Cleveland, O.
 *Western Wheeled Scraper Co., Aurora, Ill.
 *Ward Plow Co., Batavia, N. Y.
 J. D. Adams Co., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Atlas Scraper Co., Los Angeles, Calif.
 Beach Mfg. Co., Charlotte, Mich.
 Case Crane & Eng'g. Co., Columbus, Ohio
 Gallion Iron Works & Mfg. Co., Gallion, O.
 Killefer Mfg. Corp., Los Angeles
 Miskin Scraper Works Co., Ucon, Idaho
 Ryan Mfg. Corp., Chicago
 H. C. Shaw Co., Stockton, Calif.
 Slusser-McLean Scraper Co., Sidney, Ohio
 Solano Iron Works, Berkeley, Calif.

SCRAPERS, SELF-LOADING (See Scrapers, Rotary and Scrapers, Wheeled)

SCRAPERS, WHEELED

*Austin-Western Road Machy. Co., Chicago
 *Baker Mfg. Co., Springfield, Ill.
 *Euclid Crane & Hoist Co., Euclid Village, O.
 *General Wheelbarrow Co., Cleveland
 *W. A. Riddell Co., Bucyrus, Ohio
 *Western Wheeled Scraper Co., Aurora, Ill.
 Acme Road Machy. Co., Frankfort, N. Y.
 J. D. Adams Co., Indianapolis, Ind.
 American Steel Scraper Co., Sidney, Ohio
 Atlas Scraper Co., Los Angeles, Calif.
 Beach Mfg. Co., Charlotte, Mich.
 Case Crane & Eng'g. Co., Columbus, Ohio
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Miami Trailer Scraper Co., Troy, Ohio
 Miskin Scraper Wks., Ucon, Idaho
 Ryan Mfg. Corp., Chicago
 Shaw Exc. & Tools Co., Worthington, O.
 Sidney Steel Scraper Co., Sidney, O.
 Slusser-McLean Scraper Co., Sidney, Ohio
 Stockland Road Machy. Co., Minneapolis, Minn.

SCREENS, SAND, GRAVEL AND COAL

*Allis-Chalmers Mfg. Co., Milwaukee
 *Austin-Western Road Machinery Co., Chicago
 *Chicago Automatic Conv. Co., Chicago
 *Good Roads Machinery Co., Kennett Sq., Pa.
 *Littleford Bros., Cincinnati, Ohio
 Acme Road Machy. Co., Frankfort, N. Y.
 Atlas Engineering Co., Clintonville, Wis.
 C. O. Bartlett & Snow Co., Cleveland, Ohio
 Beach Mfg. Co., Charlotte, Mich.
 Deister Concentrator Co., Ft. Wayne, Ind.
 Gallion Iron Works & Mfg. Co., Gallion, Ohio
 Gifford-Wood Co., Hudson, N. Y.
 Godfrey Conveyor Co., Elkhart, Ind.
 L. P. Green, Chicago
 Geo. Hals Mfg. Co., New York
 Hendrick Mfg. Co., Carbondale, Ohio
 Iowa Mfg. Co., Cedar Rapids, Ia.
 Jeffrey Mfg. Co., Columbus, Ohio
 Link-Belt Co., Chicago
 Morrow Mfg. Co., Wellston, Ohio
 Newage Engineering Co., Newage, Mich.
 New England Road Machy. Co., So. Boston
 New Holland Mach. Co., New Holland, Pa.
 New Jersey Wire Cloth Co., Trenton, N. J.
 Pioneer Gravel Eq. Mfg. Co., Minneapolis
 Robins Conv. Belt Co., New York
 H. B. Sackett Screen & Chute Co., Chicago
 Smith Engineering Works, Milwaukee, Wis.
 Sturtevant Mill Co., Boston
 Superior Eng. Co., Warren, O.
 Universal Crusher Co., Cedar Rapids, Iowa
 Universal Road Machine Co., Kingston, N. Y.
 Webster Mfg. Co., Chicago
 Weller Mfg. Co., Chicago
 Wickwire-Spencer Steel Co., New York

SCREENS, SEWAGE

Dorr Co., New York
 Green Bay Fdry. & Mach. Wks. Green Bay, Wis.
 Link-Belt Co., Chicago
 Simplex Ejector & Aerator Corp., Chicago

SEWAGE DISINFECTING

*Wallace & Tiernan Co., Inc., Newark, N. J.
 *Paradon Mfg. Co., Arlington, N. J.

SEWAGE DISPOSAL APPARATUS

Dorr Co., New York
 Link-Belt Co., Chicago
 Pacific Flush Tank Co., Chicago and N. Y.
 Simplex Ejector & Aerator Corp., Chicago

SEWAGE EJECTORS

Pacific Flush Tank Co., Chicago and N. Y.
 Simplex Ejector & Aerator Corp., Chicago
 Yeomans Bros. Co., Chicago

SEWAGE PUMPS (See Pumps)

SEWER BLOCKS, SEGMENT

American Vit. Products Co., Akron, Ohio
 Cannelton Sewer Pipe Co., Cannelton, Ind.
 Denver Sewer Pipe & Clay Co., Denver, Col.
 W. S. Dickey Clay Mfg. Co., Kansas City, Mo.
 Evans & Howard Fire Brick Co., St. Louis, Mo.
 Laclede Christy Clay Prod. Co., St. Louis, Mo.
 Macomb Sewer Pipe Works, Macomb, Ill.
 Pacific Clay Products Co., Los Angeles, Cal.
 Red Wing Sewer Pipe Co., Red Wing, Minn.
 Robinson Clay Products Co., Akron, Ohio
 Standard Fire Brick & Sewer Pipe Co., Pueblo, Col.

SEWER BRACES

*Templeton, Kenly & Co., Chicago

SEWER CLEANING APPARATUS

Champion Corp., Hammond, Ind.
 Hepco Sewer Root Cutter Co., Freeport, Ill.
 Self Propelling Nozzle Co., New York
 Turbine Sewer Machine Co., Milwaukee
 Westinghouse Elec. Sup. Co., F. Bissell Div., Toledo

SEWER PIPE AND DRAINS

*Armco Culvert Mfrs. Assn., Middletown, Ohio
 American Vit. Products Co., Akron, Ohio
 Blackmer & Post Pipe Co., St. Louis
 William E. Dee Co., Chicago
 Denver Sewer Pipe & Clay Co., Denver, Colo.
 W. S. Dickey Clay Mfg. Co., Kansas City, Mo.
 Evans & Howard Fire Brick Co., St. Louis, Mo.
 Logan Clay Products Co., Logan, Ohio
 Ohio Vit. Pipe Co., Uhrichsville, Ohio
 Patton Clay Mfg. Co., Patton, Pa.
 Red Wing Sewer Pipe Co., Red Wing, Minn.
 Robinson Clay Prod. Co., Akron, Ohio
 Streator Clay Mfg. Co., Streator, Ill.

SEWER PIPE FORMS (See Forms, Concrete Pipe)

*Servicised Premoulded Products, Chicago
 *Standard Oil Co. (Indiana), Chicago
 Atlas Mineral Prod. Co., Mertstown, Pa.
 Pacific Flush Tank Co., Chicago and N. Y.
 Ruberoid Co., New York
 Prestite Engg. Co., St. Louis
 Ric-wil Co., Cleveland

SEWER AND CONDUIT RODS

Champion Corp., Hammond, Ind.
 Turbine Sewer Machine Co., Milwaukee
 Westinghouse Elec. Sup. Co., F. Bissell Div., Toledo

SHARPENERS, DRILL STEEL

Gardner-Denver Co., Quincy, Ill.
 Hardsocg Wonder Drill Co., Ottumwa, Iowa
 Ingersoll-Rand Co., New York
 Sullivan Machinery Co., Chicago

SHORES

Concrete Engg. Co., Omaha, Neb.
 Dayton Sure Grip & Shore Co., Dayton, Ohio
 Fischer & Hayes Rope & Steel Co., Chicago
 M. & M. Wire Clamp Co., Minneapolis
 The O. D. G. Co., Greensboro, Ky.
 Red Star Products Corp., Cleveland
 H. W. Rouse Co., Cincinnati, Ohio
 Ross-Meyer-Hecht Co., Cincinnati, Ohio
 Symons Clamp & Mfg. Co., Chicago
 Universal Form Clamp Co., Chicago

SHOULDER FINISHING MACHINES

*Moritz-Bennett Corp., Elmhurst, Ill.

SHOVELS, CRAWLER TRACTOR

*Industrial Brownhoist Corp., Cleveland
 *Manitowoc Engg. Wks., Manitowoc, Wis.
 *Speeder Mch. Corp., Cedar Rapids, Iowa
 *Trackson Co., Milwaukee
 *Universal Crane Co., Lorain, O.
 American Hoist & Derrick Co., St. Paul
 Browning Crane Co., Cleveland

Bucyrus-Erie Co., So. Milwaukee, Wis.
 General Excavator Co., Marion, O.
 Harnischfeger Corp., Milwaukee
 Link-Belt Co., Chicago
 Northwest Engineering Co., Chicago
 Ohio Power Shovel Co., Lima, O.
 Thew Shovel Co., Lorain, O.

SHOVELS, ELECTRIC

*Bay City Shovels, Inc., Bay City, Mich.
 *Industrial Brownhoist Corp., Cleveland
 *Koehring Co., Milwaukee, Wis.
 *Manitowoc Engg. Wks., Manitowoc, Wis.
 *Osgood Company, Marion, Ohio
 *Speeder Mch. Corp., Cedar Rapids, Iowa
 American Hoist & Derrick Co., St. Paul
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Byers Mach. Co., Ravenna, Ohio
 General Excavator Co., Marion, O.
 Harnischfeger Corp., Milwaukee
 Link-Belt Co., Chicago
 Marion Steam Shovel Co., Marion, Ohio
 Northwest Engineering Co., Chicago
 Ohio Power Shovel Co., Lima, Ohio
 Thew Shovel Co., Lorain, O.

SHOVELS, GASOLINE

*Bay City Shovels, Inc., Bay City, Mich.
 *Industrial Brownhoist Corp., Cleveland
 *Insley Mfg. Co., Indianapolis
 *Koehring Co., Milwaukee, Wis.
 *Manitowoc Engg. Wks., Manitowoc, Wis.
 *Osgood Company, Marion, Ohio
 *Speeder Mch. Corp., Cedar Rapids, Iowa
 *Trackson Co., Milwaukee
 American Hoist & Derrick Co., St. Paul
 Bucyrus-Erie Co., So. Milwaukee, Wis.
 Byers Mach. Co., Ravenna, Ohio
 General Excavator Co., Marion, O.
 Harnischfeger Corp., Milwaukee, Wis.
 Keystone Driller Co., Beaver Falls, Pa.
 Link-Belt Co., Chicago
 Marion Steam Shovel Co., Marion, Ohio
 McMyler Interstate Co., Cleveland, Ohio
 Mead-Morrison Mfg. Co., Boston
 Northwest Engineering Co., Chicago
 Ohio Power Shovel Co., Lima, O.
 Orton Crane & Shovel Co., Chicago
 Star Drilling Machine Co., Akron, Ohio
 Thew Shovel Co., Lorain, O.
 Universal Power Shovel Co., Highland Park, Mich.

SHOVELS, STEAM

*Industrial Brownhoist Corp., Cleveland
 *Manitowoc Engg. Wks., Manitowoc, Wis.
 *Osgood Company, Marion, Ohio
 American Hoist & Derrick Co., St. Paul
 Bucyrus-Erie Co., Milwaukee, Wis.
 Keystone Driller Co., Beaver Falls, Pa.
 Marion Steam Shovel Co., Marion, Ohio
 Orton Crane & Shovel Co., Chicago
 Thew Shovel Co., Lorain, O.

SHOVELS, SPADES AND SCOOPS

American Mfg. Co., Chattanooga, Tenn.
 Ames Shovel & Tool Co., Boston
 Baldwin Tool Works, Parkersburg, W. Va.
 Beall Bros. Co., Alton, Ill.
 Conneaut Shovel Co., Conneaut, Ohio
 Indiana Shovel Co., New Castle, Ind.
 Jackson Shovel Co., Montpelier, Ind.
 Pittsburgh Shovel Co., Pittsburgh, Pa.
 Wood Shovel & Tool Co., Piqua, Ohio
 Wyoming Shovel Works, Wyoming, Pa.

SIDEWALK AND ROAD FORMS (See Forms, Concrete)

SIGNS, STREET AND HIGHWAY

Alumond Sign & Signal Co., Chicago
 Auto Sign Display Co. of Missouri, St. Louis, Mo.
 Baltimore Enamel & Novelty Co., Baltimore
 Evernu-Century Sign Co., Boston
 Horni Signal Mfg. Corp., New York
 Ingram-Richardson Mfg. Co., Beaver Falls, Pa.
 A. D. Joslin Mfg. Co., Manistee, Mich.
 Lyle-Signa, Minneapolis, Minn.
 Municipal Street Sign Co., New York
 Niles Machine Co., Lebanon, N. H.
 Persons-Majestic Mfg. Co., Worcester, Mass.
 Redflex Street Signal Co., Cleveland, Ohio
 Rochester Street Signal Co., Rochester, N. Y.
 Standard Mfg. Co., Cedar Falls, Iowa
 Traffic Equip. Corp., New York
 Union Iron Products Co., E. Chicago, Ind.
 Western Stamping & Mfg. Co., Cleveland

SIRENS (See Fire Alarm Sirens)

SLEEVES, TAPPING AND VALVE

A. P. Smith Mfg. Co., East Orange, N. J.
 Darling Valve & Mfg. Co., Williamsport, Pa.
 Mich. Valve & Fdry. Co., Detroit
 Mueller Company, Decatur, Ill.
 Rensselaer Valve Co., Troy, N. Y.



• • ANNOUNCES A NEW LIGHT CONVERTIBLE SHOVEL

OF the same simple type of construction as the world famous Speeder Model B3, the machine that revolutionized the one-half yard field. All the important model B3 features—such as 2 speeds thruout, on drums, travel, swing, the Speeder patented crowd, light weight, and in addition several other features such as all gears, including travel gears, cut from solid blanks and running in oil-tight cases and the main drums equipped with Timken Bearings. Fully enclosed cab, electric lights and starter, are standard equipment.

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Pioneer manufacturers of full revolving, fully convertible, one-half yard gasoline shovels

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YARD

FULL
REVOLVING
FULLY
CONVERTIBLE
HIGH SPEED
TRAVEL *and*
OPERATION
thruout

WHERE TO PURCHASE

SLUICE GATES (See Gates, Sluice)

SMOKE STACKS (See Chimneys, Steel)

SNOW FENCING

*Good Roads Machinery Co., Kennett Sq., Pa.
Illinois Wire & Mfg. Co., Joliet, Ill.
Wickwire-Spencer Steel Co., New York

SNOW REMOVAL MACHINERY

*Allis-Chalmers Mfg. Co., Springfield, Ill.
*Austin-Western Road Machy. Co., Chicago
*Baker Mfg. Co., Springfield, Ill.
*Barber-Greene Co., Aurora, Ill.
*Caterpillar Tractor Co., San Leandro, Cal.
*Cleveland Tractor Co., Cleveland, Ohio
*Empire Plow Co., Cleveland
*Good Roads Machinery Co., Kennett Sq., Pa.
*N. P. Nelson Iron Works, Passaic, N. J.
*W. A. Middell Co., Bucyrus, Ohio
*Trackson Co., Milwaukee, Wis.
J. D. Adams Co., Indianapolis
Batavia Steel Plate Constn. Co., Batavia, N. Y.
Byers Mach. Co., Ravenna, Ohio
Clark Tractor Co., Battle Creek, Mich.
Fox Rotary Snow Broom Co., New York
Carl H. Frink, Clayton, Thousand Islands, N. Y.
Geo. Haiss Mfg. Co., New York
The Heil Company, Milwaukee, Wis.
Klauser Mfg. Co., Dubuque, Iowa
LaPlante-Chaste Mfg. Co., Cedar Rapids, Iowa
Mack Trucks, Inc., New York
Maine Steel Products Co., So. Portland, Me.
New England Road Machy. Co., So. Boston
Owensboro Ditcher & Grader Co., Owensboro, Ky.
Root Spring Scraper Co., Kalamazoo, Mich.
Rotary Snow Plow Co., Minneapolis
Ryan Mfg. Corp., Chicago
Walsh's Holyoke Steel Boiler Works, Holyoke, Mass.
Walter Motor Truck Co., L. I. City, N. Y.
Wausau Iron Wks., Wausau, Wis.

SPADES (See Shovels)

SPRAYERS, ASPHALT AND TAR

*Chas. Evans & Co., New York
*Littleford Bros., Cincinnati
Kinney Mfg. Co., Boston

SPRAYING MACHINERY FOR TREES

John Bean Mfg. Co., Lansing, Mich.
Deming Co., Salem, Ohio
Field Force Pump Co., Elmira, N. Y.
Fitzhenry-Gapill Co., E. Cambridge, Mass.
Friend Mfg. Co., Gasport, N. Y.
Hardie Mfg. Co., Hudson, Mich.

SPRAY PAINTING MACHINERY (See Painting Machinery)

SPREADERS, SAND

*Good Roads Machy. Co., Kennett Sq., Pa.
*Chas. Hyass & Co., New York
Goroon Mechanical Spreader Co., Philadelphia
Highway Service Co., New Bedford, Mass.
Tarrant Co., Saratoga Springs, N. Y.
Warren Bros. Co., Boston, Mass.

SPREADERS, STONE

*Austin-Western Road Machy. Co., Chicago
*The Burch Corp., Crestline, Ohio
*Chas. Hyass & Co., New York
Gallon Iron Works & Mfg. Co., Gallon, Ohio
Highway Service Co., New Bedford, Mass.
Universal Road Machinery Co., Kingston, N. Y.

STACKS, STEEL

*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Inc., Philadelphia
*Heltsel Steel Form & Iron Co., Warren, O.
*Jos. Honhorst Co., Cincinnati, Ohio
Birmingham Tank Co., Birmingham, Ala.
Canton Art Metal Co., Canton, Ohio
Chattanooga Boiler & Tank Co., Chattanooga, Tenn.
Chicago Bridge & Iron Works, Chicago
Graver Tank & Mfg. Co., E. Chicago, Ind.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Lancaster Iron Works, Lancaster, Pa.
New York Central Iron Works Co., Inc., Hagerstown, Md.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Tippett & Wood, Phillipsburg, Pa.

STANDPIPES AND ELEVATED TANKS

W. E. Caldwell Co., Louisville, Ky.
Chatta. Blr. & Tank Co., Chattanooga, Tenn.
Chicago Bridge & Iron Wks., Chicago
R. D. Cole Mfg. Co., Newnan, Ga.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Lancaster Iron Works, Lancaster, Pa.
Pacific Tank & Pipe Co., San Francisco
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
J. S. Schofield's Sons Co., Macon, Ga.
Tippett & Wood Phillipsburg, Pa.
United Iron Works, Inc., Kansas City, Mo.
W. S. Wind Eng. & Pump Co., Batavia, Ill.

STEAM SHOVELS (See Shovels, Steam)

STEEL DRILLS, HOLLOW

*Swedish-American Steel Corp., Brooklyn, N. Y.

STEEL PLATE CONSTRUCTION

*Blaw-Knox Co., Pittsburgh, Pa.
*Connery & Co., Philadelphia
*Heltsel Steel Form & Iron Co., Warren, Ohio
*Joseph Honhorst Co., Cincinnati, Ohio
*Littleford Bros., Cincinnati, Ohio
*Union Iron Works, Hoboken, N. J.
Bethlehem Steel Co., Bethlehem, Pa.
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
Chatta. Boiler & Tank Co., Chattanooga, Tenn.
Chicago Bridge & Iron Works, Chicago
Graver Tank & Mfg. Co., East Chicago, Ind.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Heil Co., Milwaukee, Wis.
Hendrick Mfg. Co., Carbondale, Pa.
Lancaster Iron Works, Lancaster, Pa.
McClintic-Marshall Co., Pittsburgh, Pa.
New York Central Iron Works Co., Inc., Hagerstown, Md.
Pennsylvania Bridge Co., Beaver Falls, Iowa
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
W. B. Scaife & Sons, Pittsburgh, Pa.
Youngstown Blr. & Tank Co., Youngstown, O.

STEEL SHEET PILING

*S. W. Lindheimer, Chicago
*Wemlinger, Inc., New York

STEEL TOWERS

*Insley Mfg. Co., Indianapolis, Ind.
*Lakewood Engr. Co., Cleveland, O.
*Ransome Conc. Machy. Co., Dunellen, N. J.
Archer Iron Works, Chicago

STOKERS, MECHANICAL

Babcock & Wilcox Co., New York
Dayton Stoker Co., Dayton, Ohio
Detroit Stoker Co., Detroit
Sanford Riley Stoker Co., Worcester, Mass.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh, Pa.

STREET AND ROAD SIGNS (See Signs)

STREET BROOMS

*Chas. Hyass & Co., New York
Kendallville Brush & Broom Co., Kendallville, Ind.
Joseph Lay Co., Portland, Ind.
Osborn Mfg. Co., Cleveland, Ohio

STREET CLEANERS' CARTS

*Chas. Hyass & Co., New York
Durlach Can. & Iron Works, Brooklyn, N. Y.
Rochester Can. Co., Rochester, N. Y.
Tarrant Mfg. Co., Saratoga Springs, N. Y.

STREET FLUHERS AND SPRINKLERS

*Austin-Western Road Machy. Co., Chicago
*Charles Hyass & Co., New York
*E. D. Etnyre & Co., Oregon, Ill.
Autocar Co., Ardmore, Pa.
Federal Motor Truck Co., Detroit
General Motors Truck Co., Chicago
Heil Co., Milwaukee, Wis.
Kinney Mfg. Co., Boston
Mack Trucks, Inc., New York
Municipal Supply Co., South Bend, Ind.
White Co., Cleveland, Ohio
Whitehead & Kales Co., Detroit

STREET LIGHTING EQUIPMENT

American Conc. Marblette Co., Forest Park, Ill.
J. B. Clow & Sons, Chicago
Electric Ry. Equipment Co., Cincinnati, Ohio
Graybar Electric Co., New York
Holophane Co., New York
Line Material Co., So. Milwaukee, Wis.
J. S. Schofield's Sons Co., Macon, Ga.
Union Metal Mfg. Co., Canton, Ohio
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

STREET SIGNS (See Signs, Street)

STREET SWEEPERS

*Austin-Western Road Machy. Co., Chicago
*Chas. Hyass & Co., New York
Acme Road Machy. Co., Frankfort, N. Y.
Butler Mfg. Co., Cleveland, Ohio
Elgin Corp., New York
Whitehead & Kales Co., Detroit

STREET SWEEPING BROOMS REPLIED

*Chas. Hyass & Co., New York
Kendallville Brush & Broom Co., Kendallville, Ind.
Joseph Lay Co., Portland, Ind.
Osborn Mfg. Co., Cleveland, Ohio
Standard Brush & Broom Mfg. Co., Chicago

STUMP PULLERS

*Beebe Bros., Inc., Seattle, Wash.
*Saagen Derrick Co., Chicago
H. L. Bennett & Co., Westerville, Ohio
Ersted Mfg. Co., Portland, Ore.
John Waldron Corp., New Brunswick, N. J.

SUBGRADING MACHINES

*Blaw-Knox Co., Pittsburgh, Pa.
*Koehring Co., Milwaukee
*Lakewood Engr. Co., Cleveland, Ohio
Ted Carr & Co., Chicago
The Hug Co., Highland, Ill.

SURFACERS & GRINDERS, CONCRETE

*Concrete Surfacing Machy. Co., Cincinnati
*Tousley Tool Co., Cleveland
Chicago Pneumatic Tool Co., New York
Cleveland Pneumatic Tool Co., Cleveland
The Dallett Co., Philadelphia
Ingersoll-Rand Co., New York

SURVEYORS' INSTRUMENTS (See Instruments)

SWITCHBOARDS

*Allis-Chalmers Mfg. Co., Milwaukee
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

TAMPERS, PNEUMATIC

*Independent Pneumatic Tool Co., Chicago
Chicago Pneumatic Tool Co., New York
Cleveland Pneumatic Tool Co., Cleveland, O.
Cleveland Rock Drill Co., Cleveland
Ingersoll-Rand Co., New York

TAMPING MACHINES, CONCRETE BLOCK

Cement Block Machinery Co., Newark, N. J.

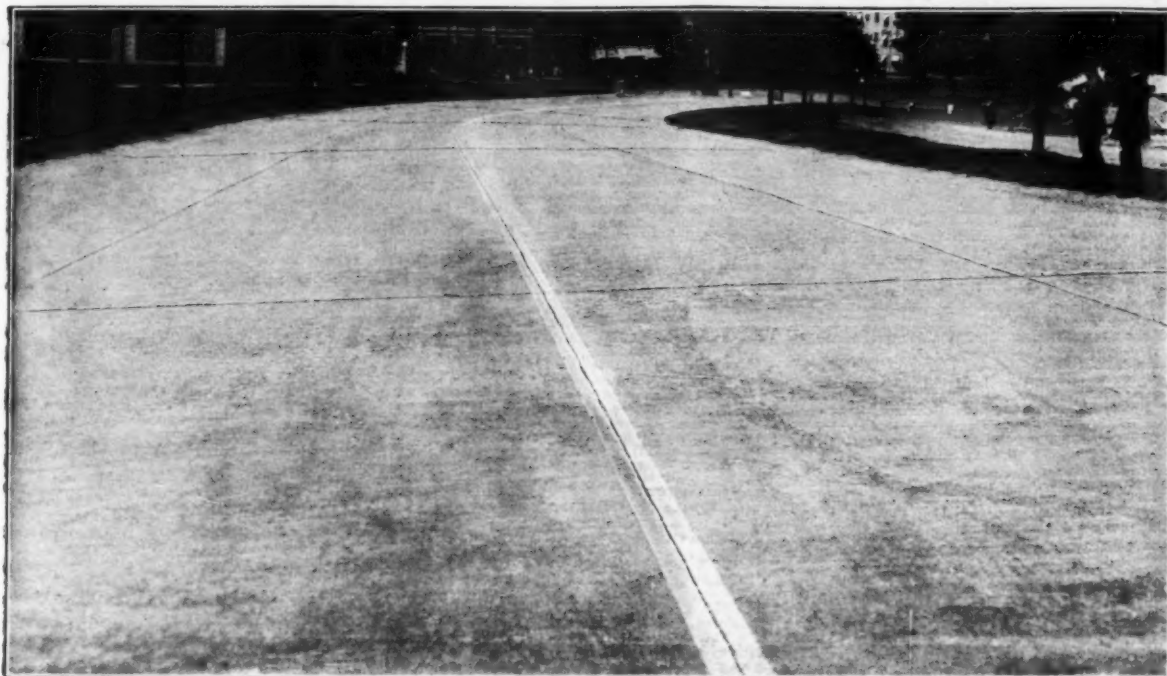
TANKS, AIR COMPRESSOR

*Connery & Co., Inc., Philadelphia
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
Chicago Pneumatic Tool Co., New York
Curtis Pneu. Machy. Co., St. Louis, Mo.
Gardner-Denver Co., Quincy, Ill.
Graver Tank & Mfg. Co., East Chicago, Ind.
Heil Co., Milwaukee, Wis.
Indiana Pump & Compr. Co., Indianapolis
Ingersoll-Rand Co., New York
Lancaster Iron Works, Lancaster, Pa.
Nagle Engine & Boiler Works, Erie, Pa.
National Tube Co., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
W. B. Scaife & Sons, Pittsburgh, Pa.
Westinghouse Tract. Brake Co., Wilmerding, Pa.
Worthington Pump & Machy. Co., New York

TANKS, STEEL

*Connery & Co., Philadelphia
*Joseph Honhorst Co., Cincinnati, Ohio
*Chas. Hyass & Co., New York
*Littleford Bros., Cincinnati, Ohio
Biggs Boiler Works, Akron, Ohio
Birmingham Tank Co., Birmingham, Ala.
S. F. Bower & Co., Inc., Ft. Wayne, Ind.
Burham Boiler Corp., Irvington, N. Y.
Butler Mfg. Co., Minneapolis, Minn.
J. I. Case Threshing Machine Co., Racine, Wis.
W. E. Caldwell Co., Louisville, Ky.
Canton Art Metal Co., Canton, Ohio
Chattanooga Boiler & Tank Co., Chattanooga, Tenn.
Chicago Bridge & Iron Works, Chicago
Columbian Stl. Tank Co., Kansas City, Mo.
Dover Boiler Works, New York
Farrell Mfg. Co., Joliet, Ill.

* Indicates that the manufacturer carries an advertisement. See index facing inside back cover. *



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This Boston boulevard, paved in 1923, was protected against expansion and contraction by the use of CAREY Elastite Expansion Joint.

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Elastite
EXPANSION
JOINT

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Graver Tank & Mfg. Co., E. Chicago, Ind.
R. Hardesty Mfg. Co., Denver, Colo.
Holl Co., Milwaukee, Wis.
Int'l. Comb. Eng. Corp., Chattanooga, Tenn.
Hendrick Mfg. Co., Carbondale, Pa.
Lancaster Iron Works, Lancaster, Pa.
McClintick-Marshall Co., Pittsburgh
Nagle Eng. & Boiler Works, Erie, Pa.
New York Central Iron Works Co., Hagerstown, Md.
Petroleum Iron Works Co., Sharon, Pa.
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
Road Supply & Metal Co., Topeka, Kans.
W. B. Sealife & Sons, Pittsburgh
United Iron Works, Inc., Kansas City, Mo.
Youngstown Blr. & Tank Co., Youngstown, O.

TANKS, WOOD

W. E. Caldwell Co., Louisville, Ky.
G. M. Davis & Son, Palatka, Fla.
Eagle Tank Co., Chicago
Hauser-Stander Tank Co., Cincinnati, Ohio
Kalamazoo Tank & Silo Co., Kalamazoo, Mich.
National Tank & Pipe Co., Portland, Ore.
Pacific Tank & Pipe Co., San Francisco
Redwood Mfrs. Co., San Francisco
A. T. Stearns Lumber Co., Boston
U. S. Wind Eng. & Pump Co., Batavia, Ill.
Wendnagel & Co., Chicago

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Eugene Dietzgen Co., New York
Keuffel & Esser Co., Hoboken, N. J.
Lufkin Rule Co., Saginaw, Mich.
The L. S. Starrett Co., Athol, Mass.

TAR

*Barrett Co., New York
American Tar Products Co., Pittsburgh, Pa.

TAR KETTLES (See Kettles)

TARPAULINS

Fulton Bag & Cotton Mills, Atlanta, Pa.

TENTS

Fulton Bag & Paper Mills, Atlanta, Ga.

TESTING LABORATORIES

*Patzig Testing Laboratories, Des Moines, Ia.
Allentown Testing Laboratory, Allentown, Pa.
E. L. Conwell & Co., Philadelphia
Robt. W. Hunt Co., Chicago
New York Testing Lab., New York
Pittsburgh Testing Lab., Pittsburgh

THAWING OUTFITS

*Chausse Oil Burner Co., Elkhart, Ind.
*Littleford Bros., Cincinnati
Aeroli Burner Co., West New York, N. J.
Hauck Mfg. Co., Brooklyn, N. Y.

TIES, STEEL

Carnegie Steel Co., Pittsburgh, Pa.
International Steel Tie Co., Cleveland, O.
Koppel Ind. Car. & Equip. Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.

TIRES, RUBBER (For Motor Trucks)

Firestone Tire & Rubber Co., Akron, O.
Flak Tire Co., Chicopee Falls, Mass.
B. F. Goodrich Rubber Co., Akron, Ohio
Goodyear Tire & Rubber Co., Akron, O.
Kelly-Springfield Tire Co., New York
U. S. Tire Co., New York

TOOL HOUSES, PORTABLE STEEL

*Blaw-Knox Co., Pittsburgh, Pa.
*Littleford Bros., Cincinnati, Ohio

TORCHES, OIL HEATING

*Chausse Oil Burner Co., Elkhart, Ind.
*Connerly & Co., Philadelphia, Pa.
*Littleford Bros., Cincinnati
American Steel Wks., Kansas City, Mo.
Hauck Mfg. Co., Brooklyn, N. Y.
Hoover Paint Works, Ft. Wayne, Ind.
Mead-Morrison Mfg. Co., East Boston, Mass.
Sewall Paint & Varnish Co., Kansas City, Mo.

TORCHES, WARNING

*Toledo Pressed Steel Co., Toledo, Ohio
R. E. Dietz Co., New York
W. J. McCloskey Torch Co., Toledo, Ohio

TOWERS (See Standpipes and Elevated Tanks)

TRACKS, INDUSTRIAL AND PORTABLE

*Lakewood Eng. Co., Cleveland, O.
Atlas Car & Mfg. Co., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Chase Foundry & Mfg. Co., Columbus, O.
Easton Car & Construction Co., Easton, Pa.
C. W. Hunt Co., Inc., W. N. Brighton, N. Y.
Koppel Ind. Car. & Equip. Co., Koppel, Pa.
Sweet's Steel Co., Williamsport, Pa.

TRACTION TREADS (See Treads, Traction)

TRACTORS

*Allis-Chalmers Mfg. Co., Milwaukee
*Caterpillar Tractor Co., San Leandro, Calif.
*Cleveland Tractor Co., Cleveland, O.
*Electric Wheel Co., Quincy, Ill.
*Huber Mfg. Co., Marion, O.
*International Harvester Co., Chicago
*John Lauson Co., New Holstein, Wis.
*United Tractor & Equip. Corp., Chicago
Advance-Rumely Thresher Co., Laporte, Ind.
Atlas Engineering Co., Clintonsville, Wis.
Autocar Co., Ardmore, Pa.
Bates Mfg. Co., Joliet, Ill.
J. I. Case Threshing Machine Co., Racine, Wis.
Clark Tractor Co., Battle Creek, Mich.
Emerson-Brantingham, Rockford, Ill.
Four Drive Tractor Co., South Bend, Ind.
Hart-Parr Co., Charles City, Ia.
Lombard Tractor & Truck Corp., New York
Mead-Morrison Mfg. Co., E. Boston
Minneapolis-Moline Power Imp. Co., Minneapolis
Rogers Bros. Corp., Albion, Pa.
Stockland Road Machy. Co., Minneapolis
Wehr Co., Milwaukee

TRACTOR MITCHES

*Gustav Schaefer Co., Cleveland
Trail-IT Co., St. Paul, Minn.
Whitehead & Kales Co., Detroit

TRACTOR LUBRICANTS

*D-A Lubricant Co., Inc., Indianapolis, Ind.

TRAFFIC LINE MARKING MACHINES

*Littleford Bros., Cincinnati, Ohio
Continental Prod. Co., Euclid, O.
Newwayo Engr. Co., Newaygo, Mich.

TRAFFIC PAINT

J. E. Bauer Co., Los Angeles, Cal.
Continental Prod. Co., Euclid, O.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Hanline Bros., Baltimore, Md.
Headley Emulsified Prod. Co., Phila.
Hoosier Paint Wks., Ft. Wayne, Ind.
Tropical Paint & Oil Co., Cleveland, O.

TRAFFIC PLATES

Alan Wood Steel Co., Philadelphia
American Pressed Steel Co., Philadelphia
Central Iron & Steel Co., Harrisburg, Pa.

TRAFFIC SIGNALS

*Toledo Pressed Steel Co., Toledo, Ohio
Alumoyd Sign & Signal Co., Chicago
Amer. Gas Accumulator Co., Elizabeth, N. J.
Automatic Signal Corp., New Haven, Conn.
Cretney Traffic Guide Co., Madison, Wis.
Crouse-Hinds Co., Syracuse, N. Y.
Eagle Signal Sales Corp., Moline, Ill.
K. E. Erickson Co., Portland, Ore.
Easo Mfg. Co., Peoria, Ill.
General Elec. Co., Schenectady, N. Y.
Griswold Safety Signal Co., Minneapolis
Horn Signal Mfg. Corp., Newark, N. J.
Kilborn & Bishop Co., New Haven, Conn.
Line Materials Co., South Milwaukee, Wis.
Little Giant Co., Mankato, Minn.
Lyle-Signs, Minneapolis, Minn.
Natl. Colorotype Co., Bellevue, Ky.
Ray-Signs Corp., New Haven, Conn.
Rochester Street Signal Co., Rochester, N. Y.
Standard Traffic Marker Co., Wichita, Kans.
Tokheim Oil Tank & Pump Co., Ft. Wayne, Ind.
Traffic Equipment Corp., New York
Wallace & Tiernan Co., Inc., Newark, N. J.
Welbach Traffic Signal Co., Philadelphia

TRAFFIC WARNING SIGNS (See Signs)

TRAILERS AND SEMI-TRAILERS

*Davenport Loco. & Mfg. Corp., Davenport, Ia.
*Electric Wheel Co., Quincy, Ill.
*Euclid Crane & Hoist Co., Euclid, Ohio
*Highway Trailer Co., Edgerton, Wis.
*Chas. Hvas & Co., New York
*Gustav Schaefer Co., Cleveland
*G. H. Williams Co., Erie, Pa.
Arcadia Trailer Corporation, Newark, N. J.
Detroit Trailer & Mach. Co., Detroit
Eagle Wagon Works, Auburn, N. Y.
Easton Car & Construction Co., Easton, Pa.
Fruehauf Trailer Co., Detroit, Mich.
Imperial Mach. Co., Minneapolis
LaPlante-Choate Mfg. Co., Cedar Rapids, Iowa
Miami Trailer-Scraper Co., Troy, O.
Muskogee Iron Wks., Muskogee, Okla.
Rogers Bros. Corp., Albion, Pa.
Smith Trailer Corp., Syracuse, N. Y.
A. Streichen & Bros. Co., Oshkosh, Wis.
Trailmobile Co., Cincinnati
Troy Trailer & Wagon Co., Troy, O.
Whitehead & Kales Co., Detroit
Winsor Tractor Equip. Corp., Ann Arbor, Mich.

TRAILERS, HEAVY MACHINERY

*Highway Trailer Co., Edgerton, Wis.
*Chas. Hvas & Co., New York

*G. H. Williams Co., Erie, Pa.
Rogers Bros. Corp., Albion, Pa.

TRAILERS, INDUSTRIAL

*Electric Wheel Co., Quincy, Ill.
*Highway Trailer Co., Edgerton, Wis.
*Chas. Hvas & Co., New York
*Lakewood Eng. Co., Cleveland, O.
*Gustav Schaefer Co., Cleveland
Chase Fdry. & Mfg. Co., Columbus, O.
Clark Tractor Co., Battle Creek, Mich.
Detroit Trailer & Machinery Co., Detroit
Easton Car & Construction Co., Easton, Pa.
LaPlante-Choate Mfg. Co., Cedar Rapids, Iowa
Miami Trailer-Scraper Co., Troy, O.
Rogers Bros. Corp., Albion, Pa.
Trailmobile Co., Cincinnati
Whitehead & Kales Co., Detroit

TRANSFORMERS

*Allis-Chalmers Mfg. Co., Milwaukee
American Brown Boveri Corp., Camden, N. J.
Duncan Elec. Mfg. Co., Lafayette, Ind.
Enterprise Elec. Co., Warren, O.
General Elec. Co., Schenectady, N. Y.
Kuhlman Elec. Co., Bay City, Mich.
Maloney Electric Co., St. Louis
Pittsburgh Transformer Co., Pittsburgh, Pa.
Sangamo Electric Co., Springfield, Ill.
Wagner Elec. Corp., St. Louis
Westinghouse Elec. & Mfg. Co., E. Pittsburgh

TRANSITS AND LEVELS (See Instruments)

TRANSMISSION MACHINERY, POWER

*Allis-Chalmers Mfg. Co., Milwaukee
*Chain Belt Co., Milwaukee, Wis.
H. W. Caldwell & Son, Chicago
Dodge Mfg. Corps., Mishawaka, Ind.
Kent Machine Co., Kent, O.
Link-Belt Co., Chicago
Webster Mfg. Co., Chicago
Weller Mfg. Co., Chicago

TRASH CANS (See Cans)

TREADS, SAFETY

*Blaw-Knox Company, Pittsburgh, Pa.
American Abrasive Metals Co., N. Y.
American Mason Safety Tread Co., Lowell, Mass.
Concrete Steel Co., N. Y.
Norton Co., Worcester, Mass.
Alan Wood Steel Co., Conshohocken, Pa.

TREADS, TRACTION

*Caterpillar Tractor Co., San Leandro, Cal.
*Electric Wheel Co., Quincy, Ill.
*Trackson Co., Milwaukee, Wis.
Belle City Mfg. Co., Racine, Wis.
Buckeye Traction Ditcher Co., Findlay, O.
Rex-Watson Corp., Canastota, N. Y.

TRENCH EXCAVATORS (See Excavators)

TRENCH BRACES (See Braces)

TRENCH PUMPS (See Pumps, Contractors')

TRENCH ROLLERS

*Trackson Co., Milwaukee, Wis.

TRUCKS, TANK & SPRINKLER (See Wagons, Tank & Sprinkler)

TUNNELING MACHINES

App Tunneling Mach. Co., New York

TURBINES

*Allis-Chalmers Mfg. Co., Milwaukee
De Laval Steam Turbine Co., Trenton, N. J.
General Electric Co., Schenectady, N. Y.
Ingersoll-Rand Co., N. Y.
I. P. Morris & De La Vergne, Inc., Phila.
S. Morgan Smith Co., York, Pa.
Murray Iron Wks. Co., Burlington, Iowa
Terry Steam Turbine Co., Hartford, Conn.
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

TURNTABLES FOR MOTOR TRUCKS

*Blaw-Knox Co., Pittsburgh, Pa.
Canton Fdry & Mach. Co., Canton, O.
Champion Engine Co., Kenton, O.
Freeman Mfg. Co., Racine, Wis.
Hug Co., Highland, Ill.
Koppel Ind. Car. & Equip. Co., Koppel, Pa.
Western Structural Co., Moline, Ill.

VALVES, CHECK

Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston
Darling Valve Mfg. Co., Williamsport, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Mich. Valve & Foundry Co., Detroit
Rensselaer Valve Co., Troy, N. Y.

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For Every Industrial Use

A VERY different crawler tractor — Model GH Trackson McCormick-Deering • Designed to operate efficiently with every kind of equipment from scrapers to front-end shovels • Fine balance and great structural strength assure quick and continuous operation under the heavy super-imposed loads and abnormal stresses of bulldozers, hoists, power graders, diggers and loaders • Wide-spaced crawlers and a low center of gravity provide the balance • Extra heavy main frames, axles, truck wheels and bearings provide the strength • Wide clearance between the crawlers and motor permits easy and secure attachment of equipment and makes all external parts readily accessible • The track shoes are of heavy electric steel, specially corrugated to grip securely, and cast in *one piece* • Operation is easy and natural with handy controls and improved hand-wheel steering • The wide usefulness of this crawler-tractor will strike home with every contractor, road builder and industrial user who is going after business and results in 1931 armed with power equipment that will handle efficiently the greatest number of different jobs • Write for bulletin No. 252 TRACKSON COMPANY, 1323 S. First Street, MILWAUKEE, WIS.

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MCCORMICK-DEERING

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WHERE TO PURCHASE

VALVES, GATE AND INDICATOR POSTS

Chapman Valve Mfg. Co., Indian Orchard, Mass.
Coffin Valve Co., Boston
Columbian Iron Works, Chattanooga, Tenn.
Crane Company, Chicago
Darling Valve & Mfg. Co., Williamsport, Pa.
Eddy Valve Co., Waterford, N. Y.
Iowa Valve Co., Oskaloosa, Ia.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Michigan Valve & Fdry. Co., Detroit
Reading Steel Casting Co., Bridgeport, Conn.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
Waterous Co., St. Paul
R. D. Wood & Co., Philadelphia

VALVES FOR GASOLINE ENGINES

Industrial Engine Parts Co., Inc., Cleveland

VALVES, RELIEF

*Neptune Meter Co., New York

VALVES, TAPPING

Eddy Valve Co., Waterford, N. Y.
Hays Mfg. Co., Erie, Pa.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Co., Troy, N. Y.
Michigan Valve & Foundry Co., Detroit
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
Waterous Co., St. Paul

VALVE BOXES AND HOUSINGS

*Central Foundry Co., N. Y.
Chapman Valve Mfg. Co., Indian Orchard, Mass.
H. W. Clark Co., Mattoon, Ill.
Clarkville Fdry. & Mach. Co., Clarksville, Tenn.
J. B. Clow & Sons, Chicago
Columbian Iron Works, Chattanooga, Tenn.
Darling Valve & Mfg. Co., Williamsport, Pa.
Eddy Valve Co., Waterford, N. Y.
Iowa Valve Co., Oskaloosa, Ia.
Kennedy Valve Mfg. Co., Elmira, N. Y.
Ludlow Valve Mfg. Co., Troy, N. Y.
Mueller Co., Decatur, Ill.
Rensselaer Valve Co., Troy, N. Y.
A. P. Smith Mfg. Co., E. Orange, N. J.
Waterous Co., St. Paul
R. D. Wood & Co., Philadelphia

VOTING EQUIPMENT FOR CITIES

Automatic Registering Machine Co., Jamestown, N. Y.
Douglas Manufacturing Co., Crete, Nebr.
Ideal Voting Booth Co., Sullivan, Ind.
Korff Manufacturing Co., Lansing, Mich.
Pennsylvania Construction Co., Marietta, Pa.

WAGONS (See Dump Carts and Wagons)

WAGON BODIES (See Dump Bodies)

WAGON LOADERS (See Loaders, Gravel)

WAGONS & TRUCKS, TANK & SPRINKLER

*Joseph Honherst Co., Cincinnati, Ohio
*Chas. Hyatt & Co., New York
*Littleford Bros., Cincinnati
Acme Road Machinery Co., Frankfort, N. Y.
J. L. Case Threshing Machine Co., Racine
Galion Iron Works & Mfg. Co., Galion, Ohio
Heil Co., Milwaukee, Wis.
Mack Trucks, Inc., New York
White Co., Cleveland

WALL TIES

Berger Mfg. Co., Canton, O.
Concrete Steel Co., N. Y.
Consolidated Exp. Metal Co., Wheeling, W. Va.
M. & M. Wire Clamp Co., Minneapolis
Milwaukee Corr. Co., Milwaukee, Wis.
Reeves Mfg. Co., Dover, Ohio
Wedgit Tie Co., Inc., New York

WASHERS, SAND AND GRAVEL

*Allis-Chalmers Mfg. Co., Milwaukee
Jeffrey Mfg. Co., Columbus, O.
Link-Belt Co., Chicago
New England Road Machy. Co., So. Boston
Pioneer Gravel Eq. Mfg. Co., Minneapolis
Smith Engineering Works, Milwaukee
Stephens-Adamson Mfg. Co., Aurora, Ill.

WATCHES, STOP

Sterling Stop Watch Co., New York

WATER MAIN TAPPING MACHINES

Glauber Brass Mfg. Co., Cleveland
Hays Mfg. Co., Erie, Pa.
Mueller Co., Decatur, Ill.
A. P. Smith Mfg. Co., E. Orange, N. J.

WATER METERS (See Meters, Water)

WATERPROOFING COMPOUNDS AND MATERIALS

*Acqua-Pruf, Inc., New York
*Barrett Company, N. Y.
*Philip Carey Co., Cincinnati, O.
*W. E. Meadows, Inc., Streator, Ill.
*Servicised Premoulded Products, Chicago
American Sika Corp., New York
Anti-Hydro Waterproofing Co., Newark, N. J.
Atlantic Refining Co., Inc., Philadelphia
Barber Asphalt Co., Philadelphia, Pa.
Euclid Chemical Co., Cleveland
Genfire Steel Co., Youngstown, O.
Headley Emulsified Prod. Co., Phila.
Keystone Roofing Mfg. Co., York, Pa.
Lehon Co., Chicago
Master Builders Co., Cleveland, O.
Mendusa Portland Cement Co., Cleveland, O.
Minwax Co., N. Y.
Ruberoid Co., N. Y.
L. Sonneborn Sons, Inc., N. Y.
Texas Company, N. Y.
Toch Brothers, N. Y.
Truscon Laboratories, Detroit, Mich.
Western Elastolite Roofing Co., Denver, Colo.

WATER PURIFICATION (See also Filters)

*Wallace & Tiernan Co., Inc., Newark, N. J.
Paradon Mfg. Co., Arlington, N. J.
R. U. V. Co., N. Y.

WATER PURIFICATION CHEMICALS

Arnold Hoffman & Co., Inc., N. Y.
E. I. du Pont de Nemours & Co., Wilmington, Del.
Electro Bleaching Gas Co., N. Y.
General Chemical Co., N. Y.
Hooker Electrochemical Co., N. Y.
Mathieson Alkali Works, Inc., N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia

WATER SOFTENERS

American Water Softener Co., Philadelphia
Crane Co., Chicago
Graver Tank & Mfg. Co., E. Chicago, Ind.
International Filter Co., Chicago
Permutit Co., N. Y.
W. B. Seale & Sons, Pittsburgh, Pa.

WATER WASTE DETECTION

Empire Electric & Water Co., Inc., N. Y.
Pitometer Co., N. Y.
Simplex Valve & Meter Co., Philadelphia

WATER WHEELS

*Allis-Chalmers Mfg. Co., Milwaukee
Jas. Leffel & Co., Springfield, O.
I. P. Morris and De La Vergne, Inc., Hydr. Div., Philadelphia
Newport News Shipbuilding & Dry Dock Co., Newport News, Va.
Pelton Water Wheel Co., San Francisco

WEED BURNERS

*Littleford Bros., Cincinnati, O.
Aeroli Burner Co., West New York, N. J.

WATER WORKS PUMPS (See Pumps)

WEIGHING MACHINES

*Conveying Weigher Co., N. Y.

WELDING APPARATUS

*Alex. Milburn Co., Baltimore, Md.
Burke Electric Co., Erie, Pa.
Clark Tractor Co., Battle Creek, Mich.
Fusion Welding Corp., Chicago
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, O.
Lincoln Electric Co., Cleveland, O.
MacLeod Co., Cincinnati, O.
Oxweld Acetylene Co., L. I. City, N. Y.
Smith Welding Equip. Corp., Minneapolis
U. S. Light & Heat Corp., Niagara Falls
Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa.

WELL SCREENS

A. D. Cook, Inc., Lawrenceburg, Ind.
E. E. Johnson, Inc., St. Paul, Minn.

WELL POINTS

*Moore Trench Mach. Co., Rockaway, N. J.
A. D. Cook, Inc., Lawrenceburg, Ind.
E. E. Johnson, Inc., St. Paul, Minn.

WELLS, CONCRETE

Wilson Welder & Metals Co., Inc., Hoboken
Kelly Well Co., Grand Island, Neb.

WELLS, GRAVEL WALL

Layne & Bowler, Inc., Memphis, Tenn.

WELL-DRILLING AND BLAST HOLE MACHINES

*Loomis Machine Co., Tiffin, Ohio
*Sanderson Cyclone Drill Co., Orrville, O.
Armstrong Mfg. Co., Waterloo, Ia.
Barkhardt Co., Kiel, Wis.

Keystone Driller Co., Beaver Falls, Pa.
Star Drilling Machine Co., Akron, O.

WHEELBARROWS

*General Wheelbarrow Co., Cleveland, O.
*Lansing Co., Lansing, Mich.
Asheboro Wheelbarrow Co., Asheboro, N. Carolina
American Steel Scraper Co., Sidney, Ohio
Case Crane & Engg. Co., Columbus, Ohio
Chattanooga Wheelbarrow Co., Chattanooga, Tenn.
Fairbanks Co., N. Y.
Jackson Mfg. Co., Harrisburg, Pa.
Puffer-Hubbard Mfg. Co., Minneapolis
Red Star Products Corp., Cleveland
Sidney Steel Scraper Co., Sidney, O.
Sterling Wheelbarrow Co., Milwaukee
Toledo Wheelbarrow Co., Toledo, O.

WHEELS FOR ALL USES

*Electric Wheel Co., Quincy, Ill.

WINCHES

*Beebe Bros. Inc., Seattle, Wash.
*Clyde Iron Works Sales Co., Duluth, Minn.
*Dake Engine Co., Grand Haven, Mich.
*Dobbie Foundry & Mach. Co., Niagara Falls
*J. S. Mundy Hoisting Eng. Co., Newark, N. J.
*Saggen Derrick Co., Chicago
*Gustav Schaefer Co., Cleveland
*Street Bros. Mach. Works, Chattanooga
*W-K-M Co., Houston, Tex.
Advance-Rumely Thresher Co., La Porte, Ind.
Chisholm-Moore Hoist Corp., Tonawanda, N. Y.
Clark Tractor Co., Battle Creek, Mich.
Erted Mfg. Co., Portland, Ore.
Fridy Hoist & Machy. Co., Mountville, Pa.
John T. Horton Co., New York
Ingersoll-Rand Co., New York
Lidgerwood Mfg. Co., Elizabeth, N. J.
Mead-Morrison Mfg. Co., E. Boston
Muskogee Iron Wks., Muskogee, Okla.
Stephens-Adamson Mfg. Co., Aurora, Ill.
Sullivan Machy. Co., Chicago

WINDOW FRAMES AND SASH (Metallic)

*Truscon Steel Co., Youngstown, O.
Wm. Bayley Co., Springfield, O.
Detroit Steel Prod. Co., Detroit
E. D. Frederick Co., Holyoke, Mass.
Genfire Steel Co., Youngstown, O.
David Lupton's Sons Co., Philadelphia
Sykes Metal Products Co., Chicago

WIRE AND CABLE

*American Steel & Wire Co., Chicago
*Williamsport Wire Rope Co., Williamsport, Pa.
American Cable Co., N. Y.
Anacosta Wire & Cable Co., Pawtucket, R. I.
Copperweld Steel Co., Glasport, Pa.
Fischer & Hayes Rope & Steel Co., Chicago
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., N. Y.
Habirahaw Cable & Wire Corp., N. Y.
Hazard Wire Rope Co., Wilkes-Barre, Pa.
Kokomo Steel & Wire Co., Kokomo, Ind.
MacWhirte Co., Kenosha, Wis.
Marion Insulated Wire & Rubber Co., Chicago
National India Rubber Co., Bristol, R. I.
New York Insulated Wire Co., N. Y.
Okonite Co., Passaic, N. J.
Page Steel & Wire Co., Bridgeport, Conn.
W. S. Robertson St. & Ir. Co., Cincinnati, O.
John A. Roebbing's Sons Co., Trenton, N. J.
Safety Cable Co., N. Y.
Simplex Wire & Cable Co., Boston
Standard Underground Cable Co., Pittsburgh, Pa.
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Godfrey Conveyor Co., Elkhart, Ind.
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R. L. Carter Co., Phoenix, N. Y.
Jaeger Portable Power Corp., Detroit
Jones Superior Machine Co., Chicago
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* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.

... For Maximum Drainage Economy use



(Above) Solving drainage problems—laying half round, flat bottom GOHI Culverts in streets of Alameda.

(To left) Installing 24" GOHI Corrugated Culvert on Dixie Highway near Falmouth, Ky., made necessary because of collapse of rigid type.



(Meet copper-bearing pure iron requirements in all accepted specifications for corrugated metal culverts.)

Use GOHI Culverts for
Reservoir Syphons and Outlets
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Corrugated Culverts

THE ever-increasing cost of modern highways is forcing attention on construction economies.

Out of costly experiments with various types and kinds of culvert, has come the conviction that GOHI Corrugated Culverts make for economy in highway construction by lowering drainage costs.

Made of Genuine Open Hearth Iron—pure iron-copper alloy—these culverts give maximum resistance to the corrosive influence of soil, water and weather. Their reasonably low first cost; low-cost

installation; flexibility that resists settling or shifting earth and vibration from traffic; demonstrated durability in countless installations;—these are factors that weigh heavily in lowering your drainage investment.

Whatever your requirements, get all the facts about GOHI Culverts. The more carefully you investigate and compare advantages and costs, the stronger will be your conviction that GOHI is the culvert for you to buy.

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St. Louis, Mo.

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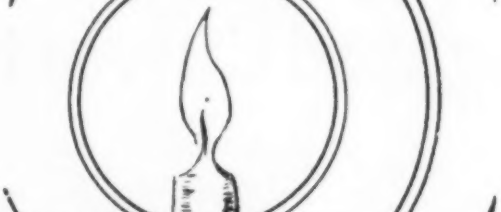
Capital City Culvert Co.
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Central Culvert Co.
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Roanoke Sales Corp.
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THE NATIONAL, STATE AND LOCAL
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with
CHRISTMAS SEALS



RICH with the lore of trail blazers—

AUSTIN-WESTERN offers the most complete line of road construction and maintenance machinery ever made available. But this is not Austin-Western's only service to the road builders of America.

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his house that has supplied road builders with equipment for their most important operations.

The Austin-Western representative is a specialist. His first purpose is to advise the most efficient and practical means of carrying out a program or meeting special conditions. Only after this step has been cared for in a truly professional way is the subject of specific equipment brought up.

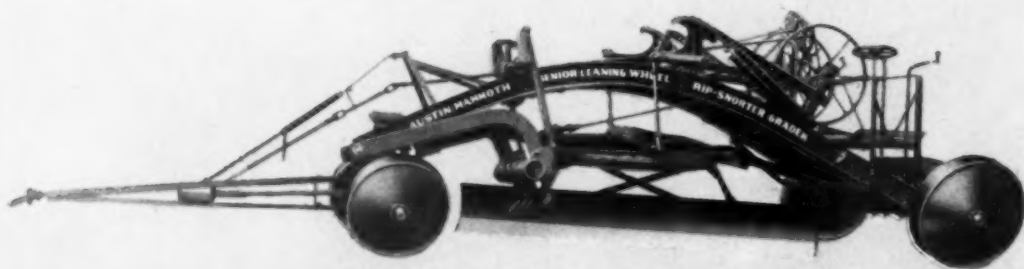
Because his recommendations are always in good faith—and because experience has proven, again and again, that Austin-Western Road Machinery reduces labor and lowers costs—the Austin-Western man is a good man to know.

Austin-Western ROAD MACHINERY

AUSTIN-WESTERN ROAD MACHINERY—COAST TO COAST



To cut the **COST** of doing a job



AUSTIN MAMMOTH SENIOR LEANING WHEEL RIP-SNORTER

THE first consideration on any road construction work is to keep costs as low as is possible without affecting the quality of the work done.

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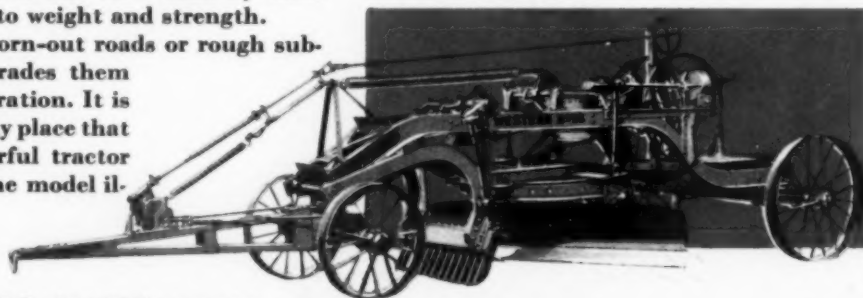
This, the first combination grader-scarifier on the market, is still in a class by itself when it comes to weight and strength.

It tears up worn-out roads or rough subgrades and regrades them in a single operation. It is built to work any place that the most powerful tractor will draw it. The model il-

lustrated is equipped with twelve-foot blades, leaning disc wheels with removable rims, and a two-piece, telescopic rear axle.

The Western No. 55 Grader with Scarifier

This sturdy machine will work successfully behind tractors of 40 hp. or less. While designed primarily for road building, it has weight enough for heavy maintenance work. It is an ideal two-purpose machine. There is *no lost motion between the hand wheels and the blade*. The regular blade is ten feet long, but twelve- or eight-foot blades may be had on order. Cut gears, ball and socket raising connections, and a new steerable offset engine hitch with enclosed worm gears running in grease—combine great strength with unusual handling ease.

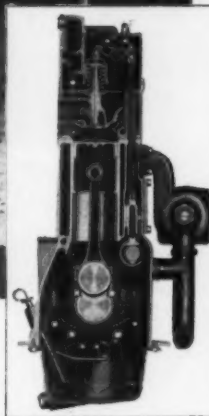
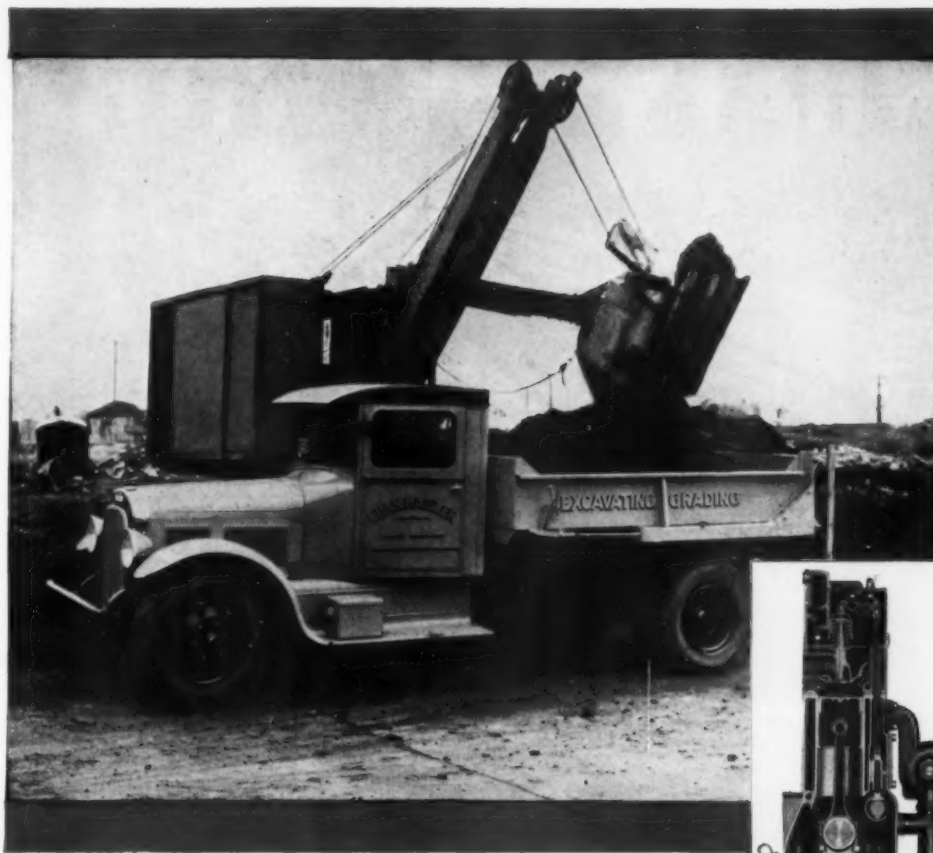


The Western No. 55 Grader with front scarifier

THE AUSTIN-WESTERN ROAD MACHINERY CO.

400 North Michigan Avenue • CHICAGO, ILLINOIS • Branches in principal cities

Leaning Wheel Graders, Straight Wheel Graders, Motor Graders, Elevating Graders, Crawler Dump Wagons, Scarifiers, Rock Crushers, Portable Conveyors, Rollers, Motor Sweepers, Street Sweepers, Sprinklers, Road Oilers, Hot Patch Portable Asphalt Plants, Plows and Scrapers.



● One of a fleet of $3\frac{1}{2}$ cubic yard dump trucks owned by Chas. Kaiser Company, powered by Continental 21R engines. Shovel powered by Continental 21R engine.

Cross section showing overhead valves with double springs and the rugged bridge truss nickel iron bearing caps held rigid to crankcase by four bolts instead of the conventional two. Center main bearing held by six bolts. Heads, bearings and crankshaft are interchangeable.

KEEPING AHEAD OF THE JOB

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Continental heavy duty motors will consistently haul loads of 5 tons and more without interruption. Continental powered shovels can be depended on to keep the trucks busy.

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For an absolute guarantee of reliable performance and long usage—specify Continental.

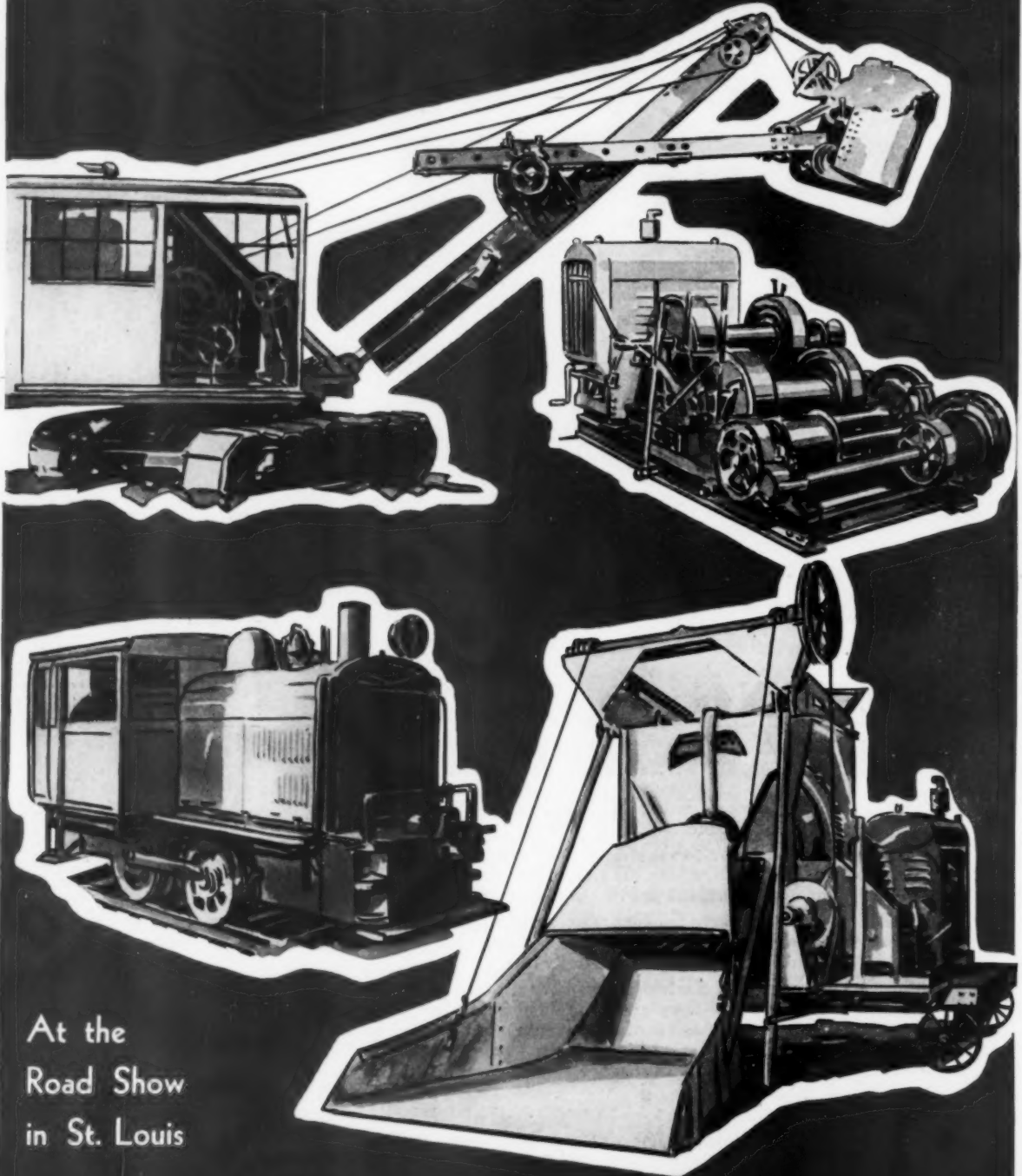
CONTINENTAL MOTORS CORPORATION
INDUSTRIAL EQUIPMENT DIVISION
Office and Factory: Muskegon, Michigan
The Largest Exclusive Gasoline Motor Manufacturer in the World
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Continental Engines

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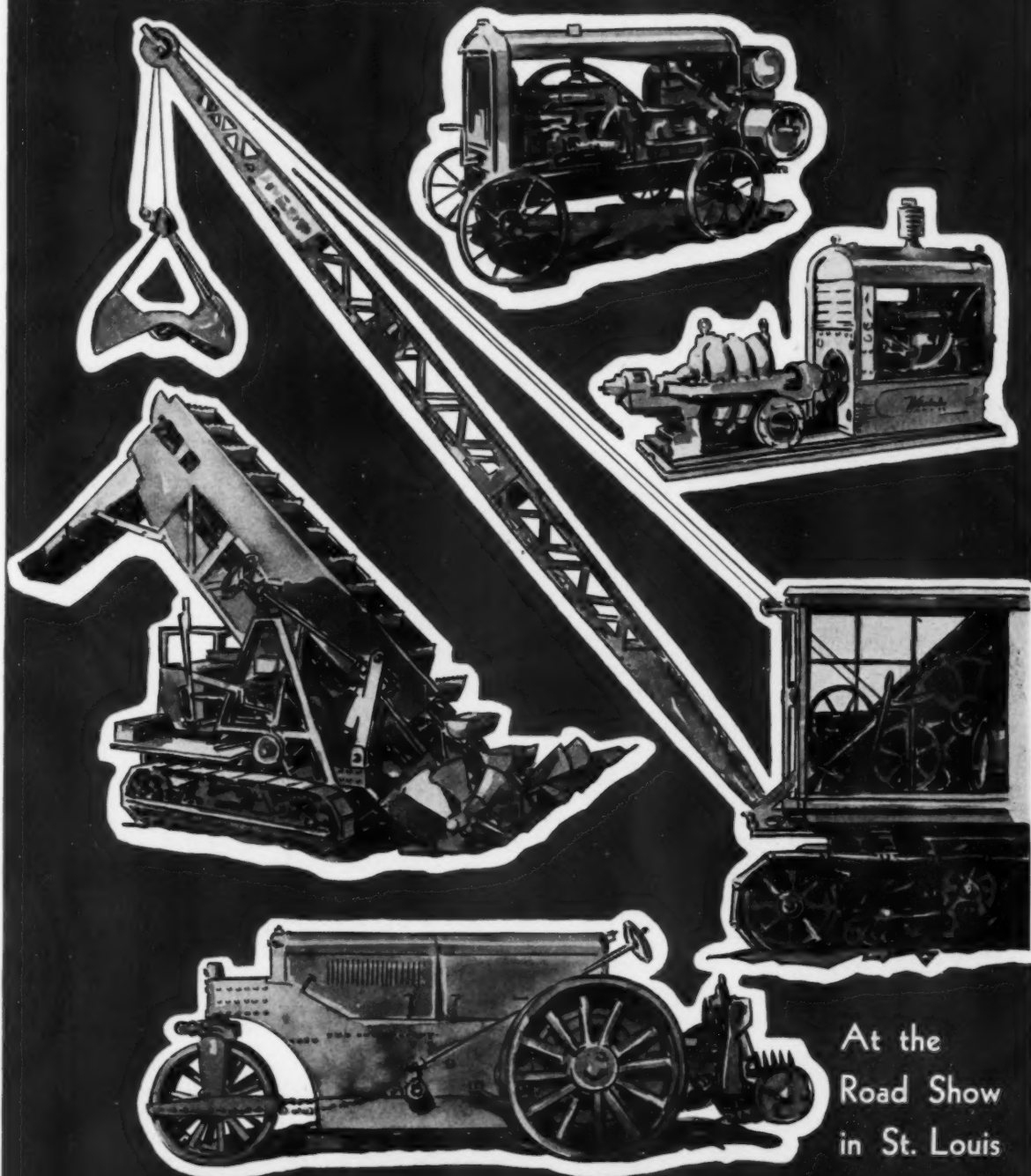


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At the
Road Show
in St. Louis

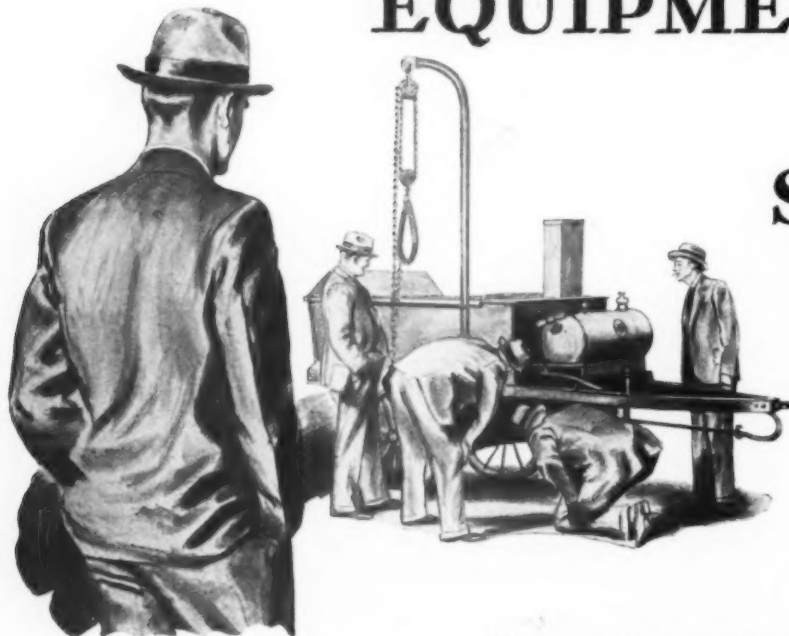
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 Without obligation to me,
 send your complete catalog
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 Maintenance Equipment.

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The Annual Convention and Road Show of the American Road Builders Association is an event looked forward to by everyone engaged in highway work. It is a vacation and an education combined.

In just a few weeks many of you will be heading for St. Louis. When you get there, we want you to keep your weather eye peeled for the large LB Sign of a Good Heater that marks the Littleford booth. There will be new equipment that we want you to see. We're not saying a word about it now, because we intend to surprise you!

By the way, it would be a good idea to look over our catalog before you go to the show. Have you a copy handy? If not, fill out the coupon and mail it. We'll send the catalog by return mail.



LITTLEFORD
Road Maintenance Equipment
SINCE 1900

LITTLEFORD BROS., 485 E. PEARL ST. CINCINNATI, O.

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Self-priming. No foot valve. No auxiliary pump or vacuum apparatus.

Portable one-hand carry. Weighs only 30 lbs.

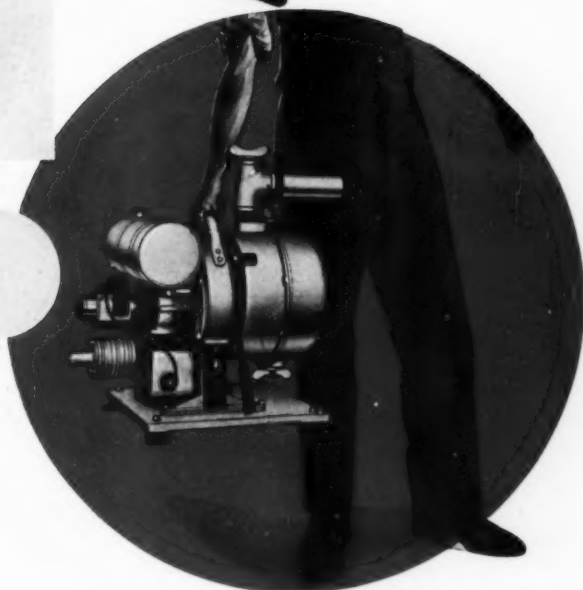
Capacity: one gallon (average) to 6000 gallons (volume) per hour.

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Only 1 moving part. Overide ball bearing. Removable open type impeller. Water-proof magnet.

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HOMELITE CORPORATION, 71 Riverdale Avenue, Port Chester, N. Y.

Distributors all over the world for demonstration and service

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**Also Portable Blowers, Air Compressors, Generators—
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South Willard Street, Burlington, Vt., paved with Standard Refined Paving Asphalt.

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Standard Asphalt Binder A
for surface treatment

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for penetration work

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for the mixing method

Standard Asphalt Joint Fillers
for brick or block pavements

Standard Cold Patch Asphalt
*for repairing all types of
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Standard Refined Asphalt
for sheet asphalt paving

Standard Paving Flux
Bridge Asphalt and
Preserving Oils



*Specifications and all other particulars
furnished on request*

STANDARD OIL COMPANY OF NEW YORK

Electric



This Electric OSGOOD Conqueror, owned by The Brown Excavating Co., Inc., Shenandoah, Pa., has been in constant operation since Sept., 1928. Mr. Canfield writes: "Despite unfavorable conditions and tough going our OSGOOD has never faltered a minute. We have dug conglomerates and blue-rock, sand-stone, coal and clay. With all the yardage it has lifted, our OSGOOD has never been idle due to a breakdown! We find the OSGOOD an ideal digging unit because of its economy, lower power consumption, and steady, constant performance."



SINGLE ELECTRIC MOTOR DELIVERS SMOOTH, QUIET, STEADY, POWER

In the Electric OSGOOD digging efficiency reaches perfection! Undivided power for swinging, hoisting and crowding flows smoothly and quickly from a *single electric motor*. Single power source eliminates the use of three smaller motors, enabling the operator to concentrate the entire motive force on each single operation. Less machinery to care for—faster digging—more power for each operation—freedom from breakdown—simple to control. Wherever A.C. or D.C. current is available we recommend the Electric OSGOOD as the cheapest, fastest, most efficient digging tool in the world. The same clutch used on the Gasoline OSGOOD is used for disconnecting the electric motor from operating machinery. The motor starts under "no load" without drawing heavy line current. Write for more information on the Electric OSGOOD!



The Electric OSGOOD differs from OSGOOD gasoline driven machines in power plant and accessory equipment only. Current is taken in at the truck and to the upper body through distributor rings and self-adjusting brushes. Convenient fittings are provided on each end of the truck for electrical connection. Start switch and safety cut-out switch are mounted on neat panelboard. Overload and no-voltage relays give complete protection.

THE OSGOOD CO.



NO ROAD BUILDING JOB IS TOO BIG FOR BUFFALO-SPRINGFIELD

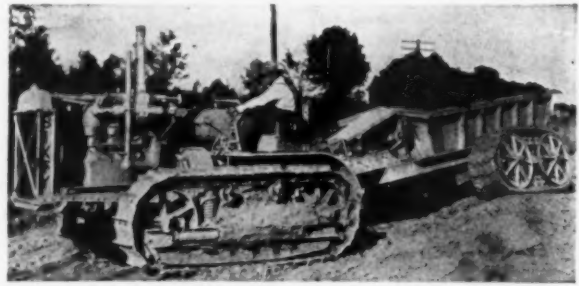
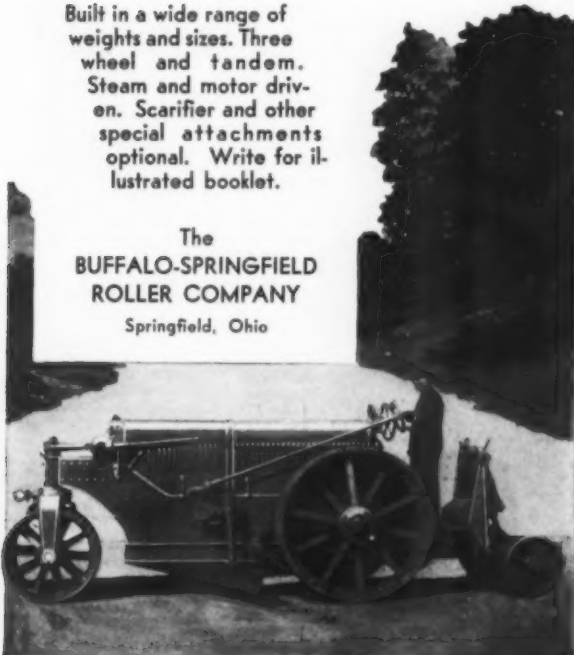
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. . . The extreme maneuverability that modern road construction demands. . . .

The Buffalo-Springfield roller embodies every characteristic necessary to meet the most strenuous road construction or maintenance requirement.

Built in a wide range of weights and sizes. Three wheel and tandem. Steam and motor driven. Scarifier and other special attachments optional. Write for illustrated booklet.

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BUFFALO-SPRINGFIELD
ROLLER COMPANY
Springfield, Ohio



DREADNAUGHT CRAWLER WAGON



A GOOD crawler wagon must run light, must carry heavy overloads, must withstand extraordinary abuse, and above all must keep running day after day under the most severe conditions. The DREADNAUGHT Wagon is built to do all of these things and is backed by a company forty years old with ten years' experience in the manufacture of all classes of crawler wheel equipment.

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CRAWLER WHEEL DIVISION

ELECTRIC WHEEL COMPANY

QUINCY, ILLINOIS



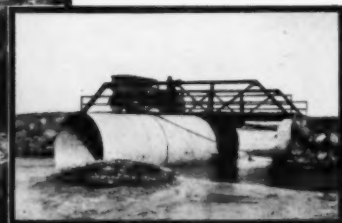
CUT THE COST OF ANY ROAD WITH

ARMCO

Culverts



Long life! Economy! This 36-inch Armco Culvert installed in Crawford County, Penna., in 1906—24 years ago—is as efficient now as when new.



A 96-inch Armco Culvert replacing a structural bridge in Minnesota.

An example of Armco improvements: Armco Paved Invert Culvert, paved to resist erosion, serving under a Maine highway.

Their 24 year
SERVICE RECORD
stands alone!

ROAD is no better than its drainage. You've always known that. But the added, underlying importance of culverts—how they affect the actual cost of the road; how they can reduce taxes . . . You've been analyzing these things more carefully of late.

Road authorities from coast to coast have found that money can be saved by installing Armco Corrugated Pure Iron Culverts. Their experience with various types and kinds of culverts leads them to the inevitable conclusion—that flexible pure iron culverts (as made



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Facts alone have guided them—facts of actual culvert performance. Armco's unequalled record of nearly a quarter-century service under the roads to date is positive evidence of this product's economy in draining any well-built road over a great period of time. Therein, of course, is the secret of lowered taxes. Cash savings result from an absence of repairs to the road and replacements of the culverts.

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Drainage installation data and culvert service records gathered in the field by the nation-wide group of Armco engineers, will be sent to you on request. Mail the coupon. Address the Association or the member nearest you.

ARMCO CULVERT MANUFACTURERS ASSOCIATION, Middletown, Ohio

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand.

Gentlemen: Send data on Armco Culverts in use as _____
(Name type of application that interests you)
Send special information on _____ (State kind of drainage problem)
I am ☐ an Official ☐ Engineer ☐ Contractor

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CEM12

ENGINEERS

*knew
it was right*

2,000,000 feet of Erosion-Resistant

ARMCO *Paved Invert* **PIPE**
now in use... and the demand grows



Under highway and street alike, wherever erosion stalks, Armco Paved Invert Pipe serves successfully. The scene, with its projecting Paved Invert Pipe, shows a bend in the road between Elk Park and Boone, Wantunga County, N. C.

FOUR years ago Armco Paved Invert Pipe was introduced. It was presented to the drainage engineering world as a forward step in the fight against erosion, enemy of all drainage structures in direct contact with hydraulic traffic.

"Give Armco Corrugated Iron Pipe that one quality which all drain pipe lacks—the ability to 'stand up' against the steady attacks of sand, silt, stones and boulders," said prominent authorities, "and the superiority of Armco Corrugated Pipe will again have been established over all comers." Armco research and "in the ground" tests resulted in adoption of a bituminous pavement for the invert of the pipe.

Engineers everywhere knew it was right. Their analyses said so. This paving, they said, will not only effectively protect the base metal against erosion; it will increase the life of the structure and decrease its cost per year.

That was four years ago. Today, more than 2,000,000 feet of Armco Paved Invert Pipe are in use, attesting the confidence of foremost engineers and proving the true worth of the paved invert principle and application. The bituminous pavement has weathered four years of service in "Nature's laboratory" under almost every condition of water flow, without perceptible show of wear!

Its success has created a large and growing demand for Armco Paved Invert Pipe. Obtain factual field data on this cost-saving product by checking and mailing the coupon—over.



Here is a protective coating—smooth, tough, resistant material which fortifies against wear and erosion—on the invert.



ARMCO CULVERT MANUFACTURERS' ASSOCIATION, Middletown, Ohio

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No. 6

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1930

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*knew
it was right*

2,000,000 feet of Erosion-Resistant

ARMCO *Paved Invert* **PIPE**
now in use... and the demand grows



Under highway and street alike, wherever crown stalks, Armco Paved Invert Pipe wears successfully. The scene, with its protecting Paved Invert Pipe, shows a bend in the road between Elk Park and Brown, Wantage County, N. C.

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More than a protective coating—a floor of tough, resilient material which fortifies against wear where wear comes—in the invert.



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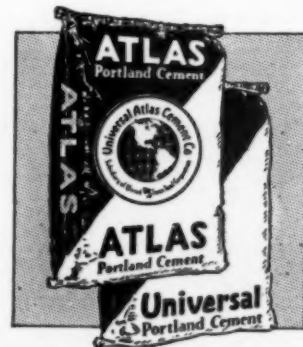
High-Early-Strength concrete approaches to garage and gasoline tanks of Epley Garage Co., Gettysburg, Pa. Universal Atlas methods and cement used. Peters Cement Products Co., Gettysburg, contractor.

Traffic travels this concrete TWO DAYS AFTER PLACING

● ● ● This garage and filling station is located at a stopover point for all overland busses using the Lincoln Highway in the East. New concrete drives to the pumps and into the garage were needed. For business reasons the owners did not want to tie up the station for a longer time than necessary.

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Jobs in Parallel



On April, 1930, the State Highway Department of Connecticut awarded a contract for the construction of 31,385 feet of 20-foot concrete pavement of 8 inches uniform thickness on Route 135, North Branford. Inasmuch as the New Haven Water Co. was to lay a new 48-inch cast iron pipe along-

side this new pavement, an arrangement was effected that the contractor who received the award for the road would handle all the rock cut for the trench of the pipe line. This protected the road so that no blasting would be done after the completion of the road. The contractor who received the award of the road job also received the contract for the pipe line so that the arrangement was automatically taken care of.

In this text we shall describe the road work first and then the pipe work, with such cross references as will be necessary to show most effectively the interconnection of the work and the interchange of equipment from one job to the other.

SIX EXCAVATORS ON ROUGH GRADE

As about one third of the new road was relocated and as there was also considerable change of grade on the old right of way, the excavation ran rather high in extent although not unusually large in quantity. To handle the grading, six machines were used: two Erie B-2 1-yard steam shovels, an Osgood $\frac{3}{4}$ -yard steam shovel, a Mead-Morrison gas shovel, a P & H gas crane on ditches and a Universal truck crane which excavated the culvert trenches. To handle the excavated material from three to five motor trucks were used for each shovel, the hauling being done by subcontract to one man who hired the trucks from individual owners locally. The excavation ran about 55,000 yards of earth and 30,000 yards of rock.

To handle the rock cuts six I-R portable compressors were used and one Sullivan compressor with I-R jackhammers. Hercules 60 and 40 per cent dynamite was used in the holes which ran from 2 to 18 feet in depth.

On one fill near the center of the project where the road ran through a swamp considerable trouble was met with settling. On one occasion the fill settled 12 feet over night and the peaty swamp on the sides rose higher than the settled fill. This condition was gradually overcome with continuous filling-in with large rocks until the fill became stabilized after reaching the bottom of the swamp. The stretch of road running through the swamp was paved with macadam and not with concrete as the fill was still settling.

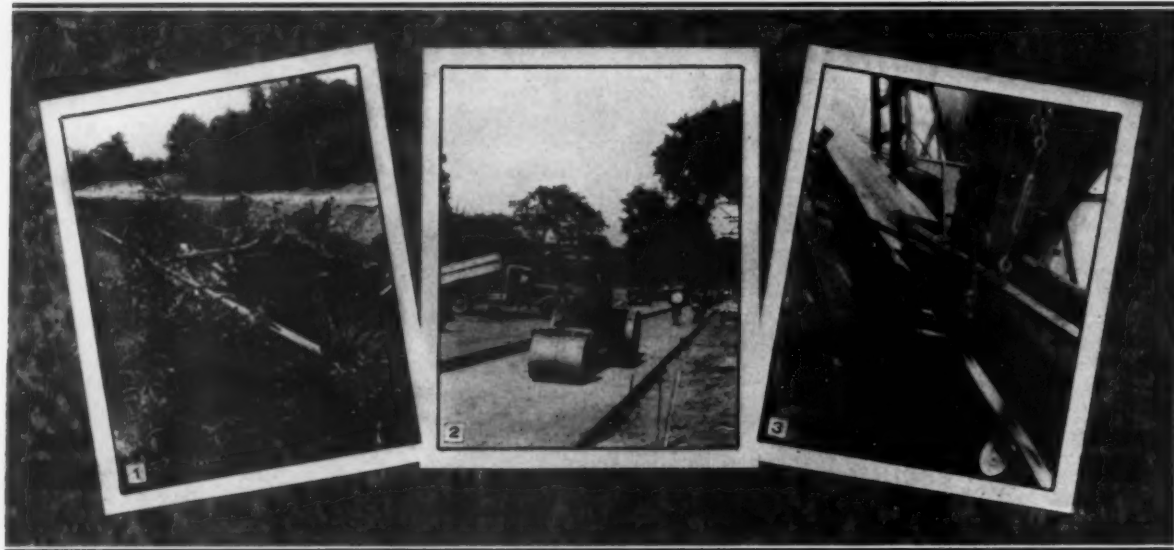
The labor organization on the rough grade consisted of a gang of thirty-five to forty men with an additional gang of the same number on clearing and grubbing and handling such hand excavation as was necessary in putting in the culverts. All of the fills were spread by hand, no tractors and bulldozers being used. The culverts were all completed well ahead of the paving and the headwalls were poured during the paving but by the use of transit-mixed concrete from the new plant recently completed by the contractor in New Haven.

An interesting phase of the design of the road is that use was made of an abandoned electric railway right of way for some distance. This also made possible the use of an underpass where the trolley line and a small railroad serving the New Haven Trap Rock Co. quarry at Great Hill had eliminated a grade crossing. A 10-foot shoulder was used on the north side of the road because of the 48-inch pipe line that was laid just ahead of the road slab. The shoulder on the south side was the usual 5-foot width.

Work on the grading was started April 15, 1930, the first concrete was poured July 7, and the concrete completed September 1, with the entire project completed before November 1, 1930.

COMPLETING THE FINE GRADE

While the rough grade was carried as close to the final grade as was feasible there was considerable work for the fine grade crew. A Warco one-man power grader



INTERESTING FEATURES OF THE JOB

1. A long stretch through swamp where the peat was forced up alongside the fill to an elevation above the fill. 2. An Austin pup maintained the subgrade in excellent condition. 3. The automatic sand valve at the sand pit regulating the flow of washed sand from the hopper to a chute leading to the dewatering box and thence to the belt conveyor carrying the sand to the stockpile

with its operator handled the fine grading with considerable speed. The excess earth was removed by teams and scrapers and hand shovelling of the five men who worked inside the forms. Six men worked on the fine grade ahead of the forms and a crew of about eleven men cut the trench and set the forms. No subgrader was used as the one-man grader handled this department to the satisfaction of all. A 10-ton Buffalo-Springfield steam roller worked on the fills ahead of the fine grade and also was called back for compacting the fills which were needed on some sections to bring the rough grade up to the final elevation. An Austin 4-ton Pup gas roller was used between the forms in preparing the final grade.

CONTRACTOR OPERATED WATER COMPANY'S SAND PIT

A sand pit, owned by the New Haven Water Co., had been operated by the contractor for a little more than two years to furnish sand for the concrete in the dams and other structures built for the company in connection with the additional water supply for the city of New Haven in the Totoket Reservoir at North Branford. The sand pit was located about 1 mile from the batching plant, and all sand was hauled to this plant at the New Haven Trap Rock Co. quarry which furnished the stone.

At the sand pit the material was excavated with a clamshell bucket and guy derrick and loaded into a hopper over the Tel Smith sand washer. Sand was fed to the washer by a shuttle feed and then flowed to the screens and back into a 2-compartment settling tank that shifted as one side filled with the washed sand. The final hopper beneath the settling tanks tapered to a delivery orifice with a rubber-faced valve, by which the speed of flow of the washed sand from the hopper was controlled automatically, the adjustment being made by weights on an arm from the valve. The valve delivered the sand to a chute, which carried it about

10 feet to a small wooden hopper with a screen in one side to remove the excess water before the sand went onto the 20-inch conveyor belt for delivery to the stock pile. The conveyor belt was 275 feet long between pulleys. A tripping device was placed on a trestle above to permit the sand's being stocked all the way along the trestle. The sand was delivered to the piles instead of to a bin for immediate delivery to the trucks hauling to the batcher for two reasons; first, it permitted the sand to dry out so that it would run freely in the batcher, and, second, the State specifications require that the sand be tested in stockpiles.

The sand was handled from the stockpile to a wooden loading bin by a stiff leg derrick and clamshell bucket. There were only five men used to operate the entire sand plant; two engineers for the derricks; one fireman to handle the two horizontal boilers which supplied steam for the plant and the two derricks, one man on the washer and one man to load the trucks. Extra help such as carpenters and mechanics required on occasion were supplied from the road job or from the contractor's plant in New Haven.

DOUBLE BATCHING PLANT INSTALLED

A side-hill bin was built for the batching plants at the New Haven Trap Rock Co.'s quarry. The bin was built as a long continuous unit, with partitions so placed that there was a large stone bin in the center and smaller sand bins at each end. The reason for this was that the Western dump cars used by the quarry and which delivered the stone direct to the bins, could not easily deliver stone to a small bin while the individual trucks which were hauling sand could easily dump into the smaller units from the larger wooden platform above the bins and laid along the railroad tracks.

Two pairs of Johnson batchers were installed, but there was only one regular batcher operator. The loca-

tion, and the possession of two pairs of batchers which had been used on other work, led to this installation, which was very economical. In the morning when the trucks, which were hired, bunched up at the batching plant, both sets of batchers were used, with a second man, who ordinarily cleaned up around the plant, running the second batcher. Whenever two trucks arrived at the plant very close together the second pair were used. This made possible the use of fewer trucks, as there was never any delay at the batchers and no idle trucks waiting to load. The trucks drove direct to the paver over the right of way, as traffic was maintained over the road at all times subject to traffic control by watchmen employed by the State Highway Department. During most of the time the batch trucks were given the right of way, as the drivers were as a rule careful about traffic which they might meet. There were periods, however, when through carelessness on the part of the truck drivers and short, narrow sections of the right of way, that it was necessary to restrict the batch trucks and hold them with ordinary traffic for one-way use of the half of the road that was open.

The stone furnished by the quarry was the standard State mix, running from $\frac{3}{4}$ to $2\frac{1}{2}$ -inch stone. All of the trucks were Relay trucks, handling three batches per load with 6 bags of cement per batch. The batches were proportioned for a 1:2:3½ batch, which was mixed $1\frac{1}{4}$ minutes in the paver.

A UNIQUE CEMENT SHED

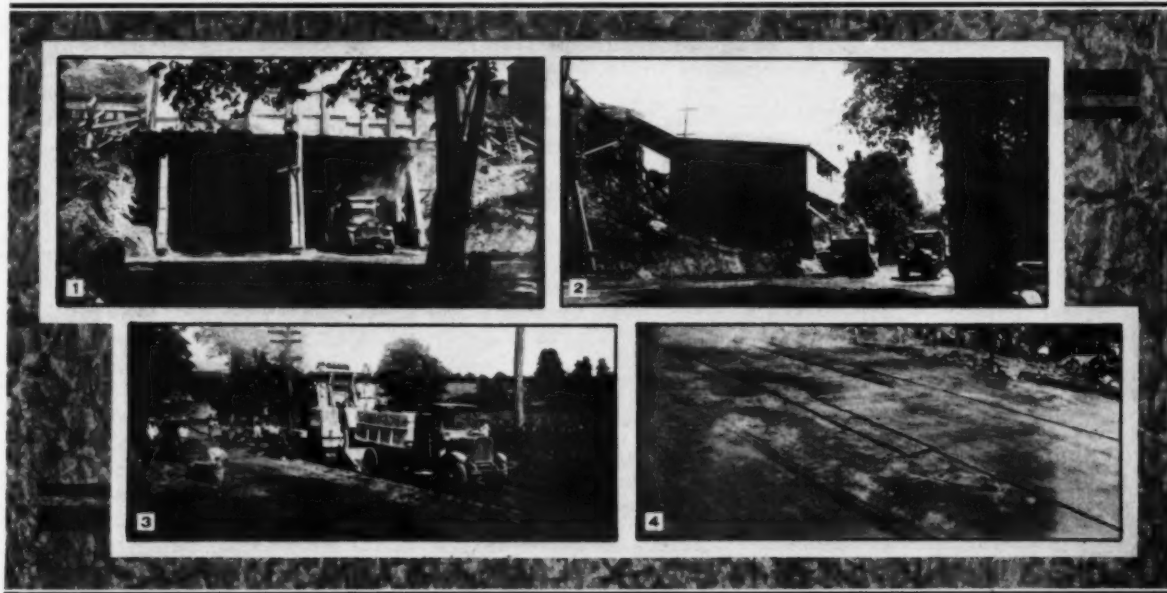
The trucks from the batcher drove about 40 feet to the cement shed, which was built on the side of the hill, and received the 6 bags of cement down a chute in a remarkably short time considering that only one man handled all the loading. The scheme of operation made this possible, as no one had to lift a single bag

of cement. The cement was received in freight cars which were spotted on the quarry track above the cement shed. One man in the car slid the cement, which was in paper bags, down a chute toward the cement house. He kept the chute filled, and the slope was so arranged that the bags just moved of their own weight until they reached a short horizontal section of the chute just above the floor of the shed. Here they stopped, and it was here that the one man in the shed stood with his back toward the delivery chute to the trucks and gave each bag a little push which sent it on its way to the truck below. As he stood there he could look down between his legs and see each bag as it hit the truck and watch the truck move ahead as each six bags were delivered to the batches.

A second chute in the far side of the shed was used when cement was being delivered from storage. The platform or horizontal section of the initial chute served as a loading point for hand trucks, which were used to carry the bags to storage in the shed when the cement was received faster than required on the job and demurrage was imminent. The entire operating crew for the batcher plant and cement was four men, one in the cement car, one in the shed, one batcher man and the clean-up man, who operated the second batchers when needed. No men were needed in the unloading of the aggregates, as they were handled by the material producers or hauling contractor.

CONCRETE CREW AT A MINIMUM

The 20-foot roadway was poured in two 10-foot strips, with no dowels or other bonding between the strips and no dowels between the slabs across the expansion joints, which were placed at approximately 61-foot intervals. The Blaw-Knox forms were oiled by one of the form-setting crew after he had cleaned them



CONCRETE WORK ON THE BLAKESLEE ROAD CONTRACT

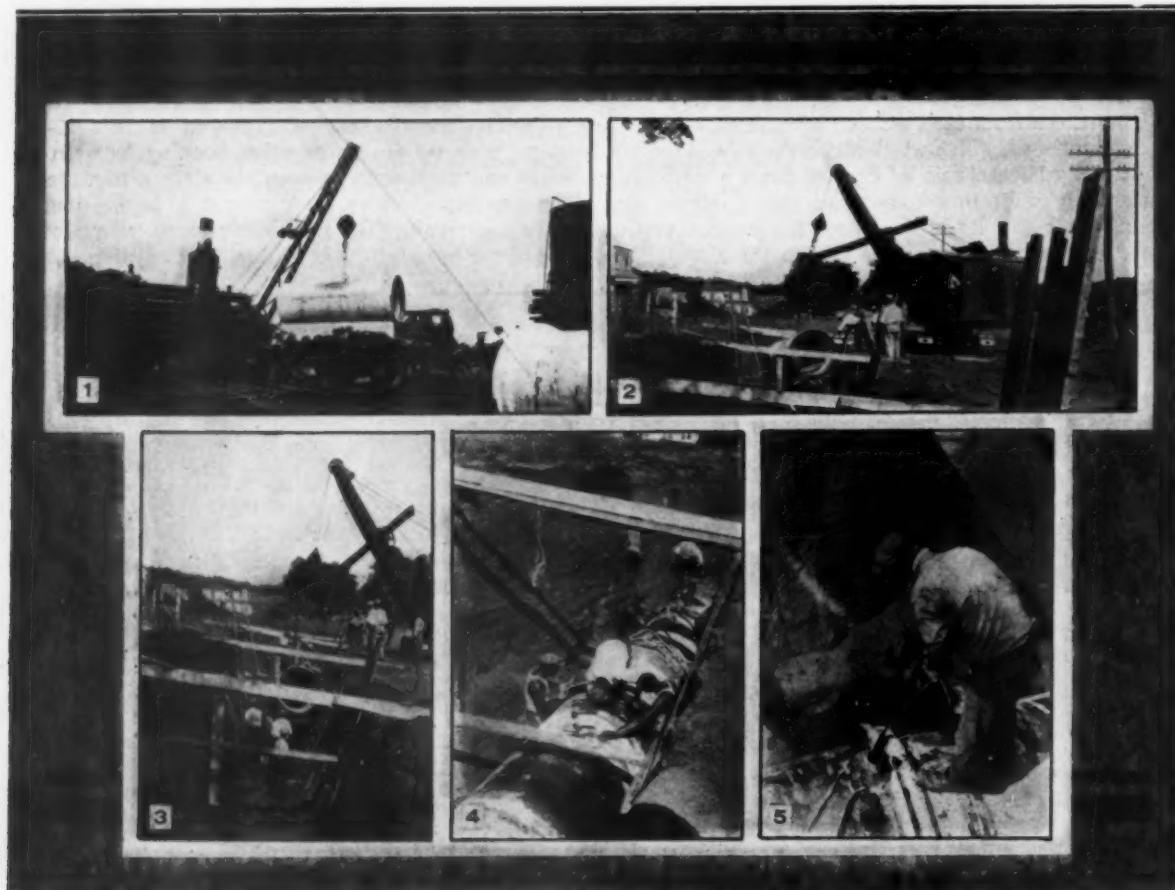
1. Truck at dual batcher plant at New Haven Trap Rock Company Mile-Long quarry. 2. The cement house adjacent to the batcher plant, showing freight car above with chute to deliver bags to the trucks. 3. Concreting a 10-foot strip with a Rex 27-E paver served by a fleet of Relay trucks and with a Lakewood screed finishing the job. 4. A trial section being cured with the new duPont fabric for retaining moisture in the concrete

thoroughly. He took care to apply plenty of oil, letting it run over to the outside of the form to preserve it and prevent any concrete sticking on the outside when some of the mix went over the edge. As an added precaution earth was piled up on the base of the form and carried close to the top. This was removed when the forms were pulled. The batch trucks turned through an opening in the forms about 300 feet ahead of the paver, and the same breach was used until the paver was within about 50 feet, then it was closed and another made at the specified distance ahead.

One man at the paver dumped the batches from the trucks into the skip. The Rex 27-E paver carried its operator and the calcium chloride man, who made the solution in the pair of drums carried on a platform opposite the operator's platform, using Solvay calcium chloride which had been spotted ahead along the shoulder in bags by the flat-bed utility truck early in the morning. A scratch board was carried at the paver and the concrete foreman did all the cleaning up necessary behind the paver. Four men worked in the pit, and two men did the spading at the forms and also handled the placing of the Truscon welded steel fabric 2 inches above the bottom of the slab after it had been struck off by the pit men. The spaders also set the expansion joints, using the Truscon steel joints. Ad-

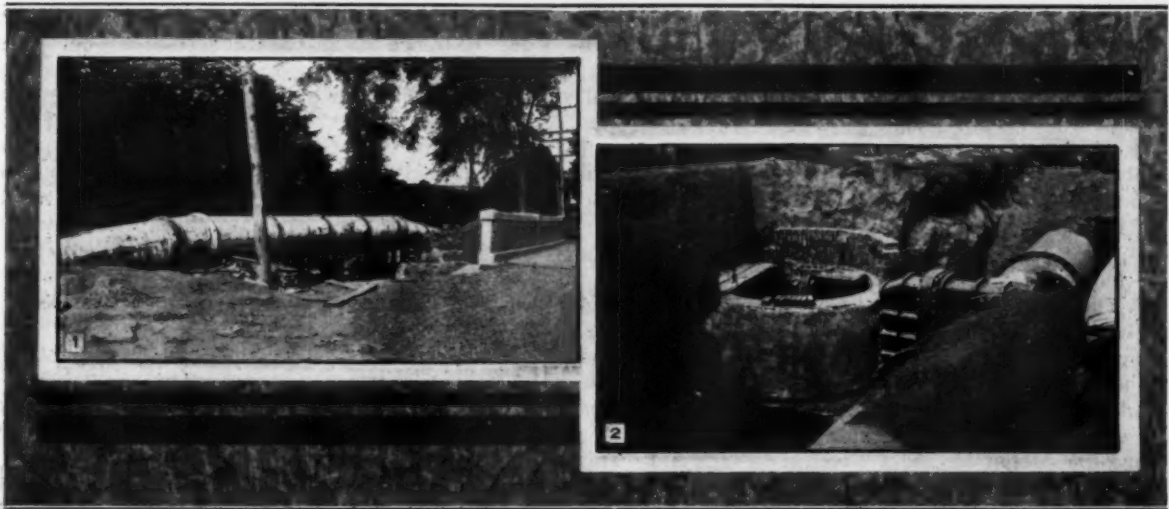
ditional reinforcing was also set at the expansion joints to prevent the unsightly and damaging diagonal cracks so common in the corners of slabs not adequately reinforced. The fabric used at the joints was cut to strips 5 feet wide and placed 2 inches from the top of the slab as well as the regular reinforcing at the same distance from the bottom. In setting the expansion joint a triangular rod was inserted in the top to prevent the filling of the notched top with concrete. Seven or eight pins were used on either side of the joint to support it while the concrete was being poured. The top of the joint was also protected with a metal cap during the pouring and while the spading was going on. Then the cap was removed and the finishing machine run up to the joint. The hand finishers removed the triangular rods as they came to them and pointed up the joint, leaving it with a neat edge and clean for the State maintenance forces to pour it with asphalt and fill with chips.

The finishing of the slab was done with a Lakewood screed, with an operator and two men to shovel to the strike-off. Four hand finishers were used, working in pairs on either side of the strip. The first two floated the surface to remove any irregularities and used the belt, the second pair finished the expansion joints and handled the edging, as well as the Lakewood straight-edges and removed any high spots, following which they



HANDLING THE 48-INCH CAST IRON PIPE FROM CAR TO TRENCH

1. Unloading the whitewashed pipe and loading onto one of the fleet of hauling trucks. 2. An Erie steam shovel with the bucket removed handled the pipe from truck to ground or truck direct to the trench. 3. Lowering a section into place. 4. Yarning a joint. 5. Pouring Hydrotite into a joint



VIEWS ALONG THE COMPLETED PIPE LINE

1. A siphon over a small stream. 2. A brick manhole surrounding one of the electrically-operated gate valves

applied the brush finish, using long-handled fiber brooms.

Two men spread the burlap, using large pieces measuring 25 feet long by 12 feet wide, made up of sacking sewed together. These large pieces were carried ahead folded and then opened up as they were spread. The burlap was immediately wet down and kept moist for 36 hours by two men. On one short section a new product of du Pont was used in curing the slab. This fabric consists of a thick layer of a coarse felt with a waterproof fabric sewed on top to prevent the water from evaporating, thus doing away with continuous sprinkling. The felt is wet or soaked, whichever is more convenient, before the material is applied, and it was found to retain its moisture satisfactorily for about ten days, which is much longer than the specified 30 hours required in Connecticut.

THREE SOURCES OF WATER

Water for the paver and for sprinkling was secured from three sources. A creek near the work was first used with three pumps on the line, a Goulds triplex pump for the initial capacity, then a Goulds rotary and a Fairbanks-Morse duplex electric pump. The Great Hill tunnel of the New Haven Water Co. was tapped and metered for a part of the supply, and during the last part of the work and for the shovels working on the water pipe trench the nearest water main of the Water Co. at the west end of the work was tapped.

The water line carried along the shoulder for the paver was a 2½-inch pipe, but the pipe from the creek was a 4-inch, and at the extreme end where water was not needed in large quantities a 1½-inch pipe was installed. Taps for the paver hoses were installed every 250 feet, and the paver was equipped with a three-way valve and two hoses, so that there was no delay and not a single batch lost through waiting for the paver hose to be moved ahead. When the second strip of concrete was being poured and traffic was using the initial strip, the hoses were carried overhead on a pipe frame swung from the paver.

THE HANDYMAN TRUCKS

Two utility trucks were kept busy all the time supplying the needs of the job. One, a flat-bed truck, handled the reinforcing fabric, expansion joints, calcium chloride and other supplies, while the second, a small dump truck, handled odds and ends and was used under the shovels at times when a larger truck would have been in the way or uneconomical.

7,000 FEET OF 48-INCH PIPE LAID IN JULY

The record day on the pipe job was one when 42 lengths of Class B cast iron pipe was laid in a trench in one day, and 7,000 feet was laid in the month of July. This line, which will connect the Totoket Reservoir, the construction of which has been described in articles in *CONTRACTORS AND ENGINEERS MONTHLY* in September, 1928, and February, 1930, with the distribution system in New Haven is a 48-inch line from the Great Hill tunnel to the New Haven city limits. It then runs through a salt meadow as a 42-inch line, and under the Quinnipiac River on piles driven in a dredged trench as a 36-inch line, and continues as a 36-inch line to join the city mains. The under-water section, which was installed by the Merritt-Chapman & Scott Corp. of New York, is 1,400 feet long.

DIGGING THE TRENCH ALONG THE ROADWAY

The flow line of the new water pipe is 8 feet below the grade of the new finished roadway. The trench was cut or dug an average of 6 feet 6 inches wide, and where sand was met it was shored as required. The abundance of sand and the dryness of the season made the handling of the sand a real problem as it would cave very easily from the vibration of traffic along the road and with the heavy trucks which were hauling the pipe and the regular traffic on this thoroughfare there was every reason to be thankful that things were not worse.

As mentioned before the rock cuts for the pipe trench were handled as a part of the road contract to protect the subgrade of the road from being shattered after the slab was completed. Three pull shovels were used to

excavate the trench on the earth sections, a P & H 600, a Keystone excavator and a Byers Bearcat. A Mead-Morrison crane with a $\frac{1}{2}$ -yard Owen clamshell bucket was used to dig out between the shovels as the pull shovels started at the same point and worked away from each other on each section excavated. The crane was also used to excavate for the manholes, which were put in every 2,000 feet for electrically operated valves, and for backfilling.

UNLOADING THE PIPE

The pipe was shipped from the Birmingham and Burlington foundries of the United States Pipe & Foundry Co. The regular pipe came from Alabama and the specials from New Jersey. All the pipe was lined with Bitumastic enamel, and then the enamel protected from the sun by whitewashing the outside of the pipe and the interior for about 2 feet in on each end. This reflected the sun and prevented the enamel from melting in the torrid temperatures of this past summer. The pipe was loaded at the foundry six lengths to an open top car and shipped by rail to a siding of the privately owned railroad which serves the Great Hill quarry of the New Haven Trap Rock Co.

A small Yale & Towne locomotive crane was used to unload the pipe and place them on pairs of cradles on the hired trucks which hauled them to the job. A single chain with a toggle clamp held the pipe in the cradles to prevent its rolling off. One cranemen and two men in the cars handled the unloading of the pipe.

The pipe was usually strung out along the shoulder of the road for about $\frac{1}{4}$ mile on the opposite side from the trench, but in certain sections where there was no room to store the pipe it was picked direct from the trucks and placed in the trench. When the pipe was strung along the shoulder ahead of the laying crew it was unloaded from the trucks by the truckmen using two skids and ropes from two niggerheads.

SETTING THE PIPE

The pipe was picked up from the shoulder or direct from the trucks by an Erie steam shovel with the bucket removed and swung over the trench, lowered and maneuvered to place with the help of the setting crew.

In the trench were two men who set 5-foot ties in pairs along the trench to grade for the pipe to rest on. These oak ties were kept set well ahead of the laying as rapidly as the trench was prepared. The foreman and two men who handled the slings set the pipe in place after a man on the road had removed the whitewash from the spigot end with a wire brush to permit a bond between the pipe and the joint material. Three men with crow bars pushed the pipe into place, while two men inserted iron wedges at the sides between the bell and spigot to line up the pipe laterally. These same two men put in the braided yarn and drove it home with calking tools.

Three kettles were used on the road to heat the Hydrotite, with one man to each kettle. Each kettleful was sufficient to pour two joints, so that there was always plenty of heated material ready for the next joint. Four men put on the snake, clay and the pouring funnel, and then the kettle man filled a coal hod with the melted Hydrotite, and a carrier took it across the road and handed it down to the man who did the actual pouring in the trench.

HAND, MACHINE AND TEAMS ON BACKFILL

The pipe trench was backfilled by hand up to the middle of the pipe and hand tamped. Above this it was backfilled with the crane and the earth compacted with pneumatic tampers. For the top, teams and scrapers were used for the backfill. The work was carried so close to the excavation that many times the earth excavated from the trench was taken back by the truck and used for backfill. The excess earth went into the shoulders of the road.

PERSONNEL

C. W. Blakeslee & Sons, of New Haven, were the contractors for both the road work done for the State Highway Department and for the pipe line laid for the New Haven Water Co. For the contractor, William H. Ryan was Superintendent, with S. P. Sears as Engineer and Assistant Superintendent. For the State Highway Department, the work was directed by A. W. Bushell as Division Engineer, with M. B. Pearce as Chief Inspector. Clarence M. Blair of New Haven was Consulting Engineer for the New Haven Water Co. on the pipe line.



Two of the Sixteen Caterpillar Sixties with Euclid Crawler Wagons Used by Charles Weaver, Contractor on Minnesota State Highway No. 7, Between Eyota and St. Charles

The Murray Construction Co.,

Knoxville, Tenn.,

Set Up Batcher Plant

Alongside Road Job

and

Saved Minutes

That Meant Fewer Trucks



ORE thought to the arrangement of the batcher plant on concrete road jobs would mean more dollars in the pockets of paving contractors. Many times the plant is set up in a conventional manner, so that the trucks back under the batcher and then out again to the cement shed. It

takes time to back anywhere, and the same distance can be covered in about half the time if the driving is straight ahead. This was well shown in the studies of the U. S. Bureau of Public Roads in its analysis of operations on grading for road jobs. Backing is a costly operation, except where there is no place to turn on a fill, and then there is nothing to do but back.

On its 8-mile concrete job east of Newport, Tenn., the Murray Construction Co., Knoxville, Tenn., chose an admirable site for its batching plant at about the middle of the job and not more than 50 feet from the right of way. This is not the most important factor in the saving of time, because there might not have been a railroad spur at that particular location. The site was used to its fullest degree by so placing the batcher that the trucks could drive under, receive the batches and then drive ahead for the cement.

Gravel was received from the Knoxville Sand & Gravel Co., Knoxville, Tenn., by freight, and was unloaded by a Lima 101 crane with a $\frac{3}{4}$ -yard Williams bucket. The crane built up a stockpile and ran on top of it to be able to reach the open-top freight cars more readily. This also made it easier to reach the batcher plant bins with a minimum of boom movement. The operating crew at the plant consisted of the crane man, the oiler, 2 men in the cars and a batcher man.

The trucks drove ahead over a corduroy road to the

cement shed and car, a distance of about 250 feet. Two men in the cars had the cement sacks piled up so that it was only a matter of a half-minute for each to toss off three bags onto the 1-batch truck. To keep down demurrage, a cement shed was located on the other side of the truck drive, so that by using a gang plank the cement could be run into the shed when the paver was not running, and then the cement could be loaded onto the trucks in the same manner from the shed except from the opposite side. The trucks then drove ahead again and turned onto the wide subgrade to return to the plant, receiving their batch tickets as they passed the office in front of the batcher.

Six bags of Volunteer cement were used per batch, and the mixing time was $1\frac{1}{4}$ minutes. The average batch was made up of 2,236 pounds of stone and 1,389 pounds of sand.

The hauling of batches was subbed to William Wolf, Wolf Cartage Co., Eagle Lake, Fla. He had a fleet of 11 International trucks, 10 Fords and 1 Chevrolet, equipped with Wood and Marion dump bodies. Payment for haulage was by the batch.

THE GRADING

The rough grading for this job was completed last year under another contract. The grade was in very good shape and minimized the fine grade work of the paving contractor. A labor crew of 20 men was used to make the fine grade and set the Blaw-Knox forms for the 8-6-8-inch slab, 18 feet wide and 8 miles long. A Lakewood subgrader was run on the forms to cut down the high spots after it had been prepared by a Russell blade grader pulled by a Caterpillar Sixty. The grade was compacted by a 7-ton Huber gas roller which had a scarifier attachment which proved effective in knocking off some of the high spots before the subgrader came along. The trench for the forms was cut with a Russell one-man grader. A Western rotary scraper cleaned up the excess earth behind the subgrader and also moved the excess loosened by the scarifier.

A Time-Saving Batching Plant Layout

CONCRETE CREW AT A MINIMUM

The trucks with the batches were equipped with dual rear balloon tires, and did not cut up the subgrade as they turned through a space in the forms. There were the usual man to dump trucks, the operator for the MultiFoote 27-E paver, who also oiled the machine, but only 3 men shovelling concrete assisted by 1 man spading, as the designed mix was very stiff and liable to honeycomb if not spaded very carefully. Two men put in the Truscon center steel and dowels as soon as the 2 men completed the final grade behind the planer attached to the paver. A Lakewood double screed finished the slab. There was also one man ahead to oil the forms and to sprinkle the subgrade. Two men emptied the cement onto the batch just before it was dumped.

For finishing there were, in addition to the machine operator, 2 longitudinal float men and 3 hand finishers. A team and wagon with driver were maintained back of the paver to bring up forms and burlap.

WATER FOR THE PAVER AND CURING

Water for the job was supplied by a Le Roi pump set on the river bank and pumping through a 2½-inch

pipe with taps 500 feet apart. The paver had 300 feet of hose.

Immediately after the finishing 2 men spread the burlap over the slab. The burlap was carried on a rolling bridge. A gang of 5 men took care of the sprinkling and earth cover, which was wet down for 10 days.

COST DATA

The job was laid over a new right of way and the fine grading and paving operations were started on May 19, 1930. The contract allowed 120 working days for the completion of the work without penalty. The 80,000 yards of concrete were bid at \$1.79 per square yard, which included handling the dirt from the grade, moving it again for curing. The completion of the shoulders was done for \$450 a mile.

PERSONNEL

D. G. Bitner was Superintendent for the contractor, the Murray Construction Co., Knoxville, Tenn. For the State Department of Highways and Public Works, Briscoe Acuff, Junior Engineer, was Concrete Inspector, and V. G. Vesser was Plant Inspector.



OPERATIONS ON THE MURRAY CONSTRUCTION COMPANY CONTRACT NEAR NEWPORT, TENN.

1. Preparing the grade on a curve around a ledge just ahead of the paver. 2. The Lima 101 crane built up the stockpile, mounted it and then unloaded aggregate directly from the cars to the Blaw-Knox bins and weighing batchers.
3. Pouring the slab, showing the pit men and finishing crew around the MultiFoote 27-E paver and the Lakewood screed. 4. Operating the longitudinal float from twin rolling bridges behind the finishing machine

An Analysis

of the

1930 Amendments

to the

New York State Lien Law

By

Henry W. Nichols, III

General Attorney, National Surety Company, New York



THE 1930 amendments to the New York State Lien Law which went into effect on October 1 are so important and recently published descriptions of them have been so inadequate that it is considered important that serious consideration be given to them by contractors.

Although many of the 1929 amendments will remain effective, those of 1930 contain vital changes. Finance charges, allowable as "cost of improvement," are, for example, restricted to "fair and reasonable" sums paid for obtaining building loans. When an application for a building loan contract is made by an owner, the formal contract must be filed, but the original application need not be filed. A building loan mortgage is defined to include mortgages made in connection with building loan contracts and also to include agreements wherein a building loan mortgage is consolidated with existing mortgages so as to constitute a single lien upon the mortgaged property.

Where property is owned by a wife, or by both husband and wife, notice of protest by the non-consenting person must be given within 10 days after learning of the contract for the improvement.

The proceeds from insurance, actually received by the owner or contractor on property improved by lienors, is made subject to their liens, after deduction of premiums paid by the owner or contractors, so that the fire or other casualty which brought about the destruction of the improvement and resulted in the proceeds of the insurance will not destroy the value of the liens. Such proceeds then become a trust fund and their mis-

application renders the owner, contractors or sub-contractor receiving the funds guilty of larceny and punishable as provided in the penal law of the State. The 1930 legislation also provides that no mortgage, recorded subsequent to the commencement of the improvement and before the expiration of four months after completion thereof, shall have priority over liens thereafter filed, unless it contains the covenant making a trust fund of the proceeds of such mortgage. The 1930 legislation further amends subdivisions 2-3, Section 13, as amended in 1929, so that every such building loan mortgage and every mortgage recorded subsequent to the commencement of the improvement and before the expiration of four months after the completion of the improvement shall contain a covenant by the mortgagor that he will receive the advances secured thereby as a trust fund to be used first for the purpose of paying the cost of improvement.

It is further provided, however, that, if the party executing the building loan contract is not the owner of the fee, but is the party to whom such advances are to be made, the filed building loan contract shall contain the said covenant by such party executing such building loan contract in place of the covenant by the mortgagor in the building loan mortgage. But nothing in this provision imposes upon the lender any obligation to see to the proper application of such advances by the owner.

The time in which to file assignments of contracts for the performance of labor or the furnishing of material for public improvements or money due thereon has been changed by the 1930 amendment to 20 days after the date of such assignment instead of 10 days as was provided in the old law.

The 1930 amendments make several changes relating

to discharge of liens. A lien for private improvements on real property may now be released in whole or in part, or released as to a portion of the estate affected thereby by the filing of a certificate of the lienor, in the office where the notice of the lien is filed, stating the manner in which the lien is satisfied or released.

There is provision for the discharge of record of liens, where invalid because of the character of the labor or materials furnished or for failure to comply with sections relating to contents and filing of notices of liens, by an application for a court order summarily discharging of record the alleged lien, which application must be based on a verified petition containing the facts.

A lien for a public improvement may be discharged by lapse of time: (a) where 3 months have elapsed since the filing of the notice of lien and no order continuing it has been filed or action to enforce the lien has been commenced; and (b) when the period of time, for which the lien has been continued by order, has expired and no action has been started.

The contractor may secure a court order to permit the release of a part of the sum standing to such contractors' credit by reason of a public improvement.

Practice in cases of public liens is conformed to practice relating to private liens by permitting cancellation of liens by court order on failure to commence suit after giving 30 days notice.

The 1930 amendments provide for the vacating of liens for a public improvement by order of the court. But notice must be served upon the lienor personally or in such other manner as the court may direct, and shall require the lienor to commence his action to enforce the lien within a time specified in the notice and not less than 30 days from the time of service.

The 1930 legislation requires the inclusion in building loan contracts of a verified statement by the borrower showing the consideration paid for the loan; other expenses, if any in connection with the loan, and the net sum available to the borrower for the improvement.

A new section in the 1930 statute repeals the old section, including 1929 amendments, as to Parity of Liens on Public Improvements.

A lienor may, by filing a certificate, subordinate his lien to a subsequent mortgage.

The 1930 amendments make diversion of funds borrowed on a building loan mortgage a larceny instead of a misdemeanor.

Contractors and sub-contractors are not required to keep separate bank accounts for each contract but separate book accounts must be kept for each improvement.

In cases of wilfully exaggerated liens, under the 1930 amendment, no subsequent lien may be filed for the same claim. The owner or contractor may recover damages including attorneys' fees for the filing of a wilfully exaggerated lien.

The new amendments which went into effect October 1 do not apply to mechanics' liens, building loan contracts, mortgages, assignments or orders, attachments, judgments, or to claims or liens acquired in any action or proceeding or to contracts for the improvement of real property, made prior to the date when the Act takes effect. Nothing contained in the new law shall in any wise affect any action or proceeding pending in court prior to October 1.

Laying a 72-Inch Water Supply Intake Pipe

THE long dry season during the summer of 1929 verified the contention of the water commissioners of Erie, Pa., that the present plant had reached its maximum capacity at peak loads. At a special election on July 25, 1929, the taxpayers voted a bond issue of \$1,700,000 for an additional intake pumping station and filter plant.

The new plant, to be known as the West Filtration Plant, is to be located on Erie Harbor, about one-third of a mile west of the present city limits on a plot of land known as Summerheim or Tracy Point. The Montrose Contracting Co., New York City, received a contract for furnishing and laying a 72-inch riveted steel intake pipe 8,800 feet long and having a capacity of 70,000,000 gallons per day. The contract price is \$530,000, and the work must be completed within a period of 24 months.

Two Link-Belt heavy duty crawler cranes, equipped with Williams $\frac{3}{4}$ -yard Hercules clamshell buckets dug the intake pit. The material handled was clay, gravel and blasted rock. One of the machines was originally shipped to Brooklyn, N. Y., in 1925, where it started on a large sewer job in Flatbush. It had been in service there a little over one year when it was shipped to 60th Street, excavating sand and loam and timbering on sewer work. Then it went to Sheepshead Bay, Long Island, for over one year of sewer work, from which it was shipped to Rockaway Beach, L. I., and used five months for handling piles and concrete. It was then shipped to Norristown, Pa., where it was used on railroad work, after which it landed on the Erie job for another two years.

The Montrose job starts at the intake pit or well into which the 72-inch intake pipe will empty. A trench, the bottom of which will be 24 feet below the water surface of Presque Isle Bay, will be excavated, into which the steel riveted pipe will be placed and then covered. The top of the pipe will be from 12 to 14 feet below the water level. Eight feet of this trench will be excavated in solid rock. The pipe will extend across the bay and the outer peninsula and into Lake Erie at a depth of 40 feet, terminating in a crib 8,800 feet from the mainland.

The entire project is under the direct supervision of James S. Dunwoody, General Superintendent of the Water Works of Erie and Paul Jones is Resident Engineer and General Superintendent of the Montrose Contracting Co.



Link-Belt Gasoline Crawler Crane with Williams $\frac{3}{4}$ -Yard Clamshell Working on Blasted Rock and Tough Clay Near Erie, Pa.

Organization

for a

West Virginia

Road Job



ONE of the first concrete jobs in West Virginia to be handled with 9-foot strips instead of the customary 18-foot width was laid this past summer by W. H. Armstrong & Co., of Weston, W. Va. This Federal Aid Project 156A, on the Weston-Walkersville road, was 8.2 miles long. With a well balanced organization the contractor regularly poured around 1,800 feet of the 9-foot strip per day, with a maximum of 2,538 feet. The State Road Commission had expected that the contractor would pour a larger footage per day with the narrow strips, but such was not the case as there was just as much form to set per foot of 9-foot strip as there was for the usual 18-foot width of pavement. The chief advantage seemed to be in the less cumbersome finishing machine for the narrower strip with less throw of the forms, and hence a better finished pavement.

FINE GRADING

The fine grading was started about the first of May and the actual concreting on May 7, 1930. The equipment for the fine grade consisted of a Lakewood subgrade rooter and a Caterpillar Thirty pulling an Adams No. 10 blade grader. The revised grade necessitated some rock excavation which was prepared for shooting by a compressor mounted on a Fordson tractor and I-R jackhammers. A Galion 5-ton gas roller was used to compact the fine grade after the subgrader had been used and hand labor filled in any low spots. The same

With Batching and Hauling

by Subcontract,

W. H. Armstrong & Co.

Handled Work Expeditiously

roller was used between the forms when there was any disturbance of the subgrade.

The Truscon 7-inch forms were set by 4 form setters assisted by a gang of 12 laborers who prepared the trench and also worked on the fine grade.

THE UNLOADING AND BATCHING PLANT

The entire operation of handling the aggregate and hauling the batches was done by subcontract on a ton-mile basis with 0.8-mile dead haul by Ash Brothers, Clarksburg, W. Va. Sand and gravel were received by rail on a siding in Weston. The sand came from the Ohio Valley Sand & Gravel Co., New Martinsville, W. Va., and the same outfit also supplied the gravel, which was received in bottom-dump cars and dumped into a pit from which it was clammed by a Marion 21 steam crane with a Williams bucket. Sand was shipped in



Setting Wood Forms on the Inside of a Widened Curve and, in the Foreground, the Timber Wedges Used to Permit Trucks to Run On and Off the Completed Slab Without Damage to Springs or Slab

gondola cars and clammed directly from the cars to the stock-pile, or to the Blaw-Knox batcher.

The average batches were 1,365 pounds of sand and 2,500 pounds of gravel with seven bags of cement. The freight cars were moved without difficulty by the crane using the bucket to bite the steel cars and swing the boom to start the car. With the wooden gondola cars the bucket was set down in the cars and the boom swung.

A fleet of 15 trucks, 11 Internationals and 2 GMC's with Wood underbody hoists and 2 Reo trucks with Heil hoists, was used to haul the batches, with 2 batches

per truck. All the trucks were equipped with dual pneumatic rear tires.

After receiving the batches the trucks ran to a freight car on the siding about 150 feet away, where 2 men loaded the 7 bags of cement on each batch.

HANDLING THE TRUCKS ON THE SUBGRADE

When the first strip was being poured the trucks were turned through breaks in the forms and backed to the Koehring 27-E paver. After the first strip was completed and opened to heavy traffic the trucks ran up the strip, turned on the shoulder away from the second strip, and then back over the strip and onto the subgrade over the timber to ease the drop from the concrete to the grade.

POURING THE SLAB

Two men were used to dump the batch trucks at the paver after the cement had been emptied from the bags onto the individual batches by 2 men. One man oiled the forms ahead of the paver, and also tamped the forms. Two men shoveled to and from the subgrade planer attached to the paver and then the oiler wet down the grade as necessary. The paver operator took care of any minor repairs and adjustments in the machine assisted by the oiler. The batch was approximately 1: 1 $\frac{3}{4}$: 3 $\frac{3}{4}$ and was mixed a minimum of 1 minute.

There were 4 pit men with one extra on curves, and 2 spaders who also used the hand strike-off which leveled the concrete 2 inches below the top of the forms to support the welded steel fabric which was placed by the pit men.

The Lakewood screed was equipped with a plank shod with an iron plate for use on widened curves. The pit men also placed the expansion joints at the beginning and end of all curves both vertical and horizontal, at the center of all vertical curves and at the end of the day's run.

On the widened curves one of Lakewood's self widening attachments was used and the curves were manipu-



MAKING SPEED AROUND A CURVE

1. International truck delivering a batch to the Koehring 27-E paver and the Lakewood screed finishing the 9-foot slab.
2. Close-up of the screed showing the beam attached for finishing around a widened curve



Applying the Silicate of Soda for Curing the Slab.

lated with a minimum of difficulty. When the curves were being approached it was necessary simply to change from the crowned screed board to the flat screed board, which took about 5 minutes time of the concrete crew.

FINISHING AND CURING

There were 2 screed men and 3 finishers who edged, floated with the 12-foot longitudinal floats and belted with burlap. After the slab had been belted, the burlap was dragged along the slab to give it a slightly roughened surface.

Following the finishing 2 men covered the slab with strips of burlap. These strips were the same length as the pavement was wide, which made it necessary to use 15-inch wide burlap strips laid longitudinally on the widened sections. On the following morning the burlap was removed and taken ahead and the surface of the slab flushed with Grasselli silicate of soda by 1 or 2 men. The pavement was opened to light traffic at the end of 14 days.

WATER SUPPLY

Water for the paver was supplied from a creek by a C H & E pump through 2½-inch pipe with taps every 160 feet. The paver hose was 100 feet long.

QUANTITIES AND UNIT PRICES

Unclassified excavation	32,000 cubic yards	.45
Dry excavation	200 cubic yards	1.00
Class A concrete	10 cubic yards	17.00
Class B concrete	60 cubic yards	15.00
Reinforcing steel	500 pounds	.06
18-inch reinforced concrete pipe	100 linear feet	2.00
24-inch reinforced concrete pipe	20 feet	3.00
Cement concrete pavement	17,150 cubic yards	11.20
Metal reinforcing, Type A	340,650 pounds	.0475
Premoulded expansion joint	4,750 linear feet	.14
Project markers	2	25.00

The total bid price of this job on which the contract was awarded was \$224,635.88.

PERSONNEL

This project was built by W. H. Armstrong & Co., Weston, W. Va., for whom W. B. Hopke was Superintendent. James Ash was Superintendent for Ash Brothers of Clarksburg, W. Va., subcontractors for the batching and hauling. The work was under the direction of C. R. Duncan, Senior Engineer, Fourth District, with J. W. Sexton as Inspector.

A 14-Mile Pipe Line Laid Through Swamps

THE water supply problem of Thibodaux, La., was solved recently by the construction of an 8-inch water supply line from the Mississippi River, 14 miles away, to the city reservoir. The use of oxwelding, although not included in the original specifications, was decided upon because of the superior qualities of the joints. This decision was especially fortunate because the line, in crossing 6 miles of swamp and bayou, is exposed to salt water overflow. Protected only by a coat of acid-resisting paint, the ability of oxwelded joints to resist corrosion will prevent trouble in this area.

The contractor selected to build the line had had no previous experience in either pipeline construction or welding. He called upon a welding service operator and had his men thoroughly instructed in performing the work. Because this work was done under especially unfavorable conditions, the actual details of its organization and execution are interesting.

BOARD SKIDS NECESSARY

Before welding was started the line-up crew went ahead into the swamps, laid flat board skids to facilitate the transportation of material, and built bridges over the creeks. The acetylene generators and oxygen cylinder racks were fitted to wagons. Skid wagons for lining the pipe were prepared, and then, because so much of the distance was swamp land which afforded no firm footing, the pipe was welded into 1,500-foot lengths, sealed with bull plugs at the ends, and hauled into place on skids.

The bull plugs were then removed, the pipe joined with expansion-type Dresser connections and placed in a trench 24 inches deep. At some points the ground was so soggy that to prevent undue strains on the line if sinkage occurred, cypress ties were placed under it every 30 feet. The result of such careful organization was evident at once. On the first day, with only one tacker and two welders, one-third mile of pipe was welded.

Later, when there were more welders available, the work progressed at an even better rate. In the areas where flooding was imminent, the men worked in two shifts a day, starting at 4 o'clock in the morning. In the open places the intense heat made it necessary for them to work under large umbrellas.



Oxwelding a Joint on the 8-inch Water Line from the Mississippi River to Thibodaux, La.

Paving Canyon Road,

Multnomah County, Oregon

By
W. A. Scott



THE regrading and paving of Canyon Road in Multnomah County, Oregon, is an interesting example of modern highway work. The regrading, comprising 3 miles of continuous cuts and fills on a relocated route, was completed in 1928, and was described in

CONTRACTORS AND ENGINEERS MONTHLY, February, 1928, page 84. The 52-foot road-bed, after it had been surfaced with crushed rock and allowed to settle under traffic for about 18 months, was paved with cement concrete in the summer of 1930. The paving operations were completed in September. The regrading, drainage and rock-surfacing cost the county about \$533,000. The paving contract amounted to \$181,422.

THE ORIGINAL ROAD

The old highway, originally graded about 70 years ago, opened a route from Portland westerly into the Tualatin valley. The first 3 miles, beginning at the Portland end, extended up Canyon Creek, thence over the summit to a connection with valley roads. The canyon section of the route followed closely the meanderings of the creek, the latter flowing easterly and draining a portion of the Willamette hills lying west of Portland. Later, the canyon portion was first macadamized and then paved. But the road was narrow, had some heavy grades and many sharp curves, and was subject to damage by flood waters.

This canyon route for years had been recognized as one having both commercial and scenic value. With this in mind, the county authorities, in 1927, decided upon a plan of reconstruction that would convert the old road into a serviceable and attractive driveway.

THE RELOCATED ROUTE

The relocated line up the canyon and over the summit takes a more direct course, at a higher elevation, eliminates all sharp curves and reduces grades to a maximum of 5 per cent. The line of the new highway runs from 8 feet to 30 feet higher than that of the old road. The regrading required heavy side-hill excavations, deep shoulder cuts and extensive fills. The excavated material, amounting to over 500,000 cubic yards, comprised solid rock, gravel, sand, clay and soil.

In the alternation of cuts and fills along the line the yardage of the two were well balanced.

CRUSHED-ROCK SURFACING

The crushed-rock surfacing, requiring 30,000 cubic yards of material, was laid in 1929. This consisted of a 6-inch base course of 3-inch rock, and a 3-inch top of 1½-inch rock, the voids in the latter being filled with rock screenings. The top course was then given an application of ½-gallon of road oil per square yard, by the penetration method. The drainage of this 3-mile section was effected by a system of sidehill drains, concrete culverts and storm sewers.

CANYON ROAD PAVING

A contract for paving the relocated, regraded Canyon Road was awarded, about June 1, 1930, to I. L. Young, Portland, for \$181,422.97. The project required 66,866 square yards of concrete paving, 29,000 lineal feet of 7 x 18-inch concrete gutters, integral with the pavement; 185 concrete catchbasins, 32,000 lineal feet of contraction joints and 6,300 lineal feet of expansion joints.

CEMENT AND AGGREGATES

The 27,200 barrels of cement required was furnished by the Oregon Portland Cement Co.; the 19,000 cubic yards of sand and gravel for aggregates was supplied by the Central Sand & Gravel Co., Portland. In addition to these, about 3,700 cubic yards of river sand was required as a sand cushion underneath the concrete pavement.

TWO 18-FOOT TRAFFIC LANES

The concrete paving was laid in two parallel 18-foot roadways, separated from each other by a 4-foot strip of crushed rock. The 4-foot strip, built up to the level of the pavements, forms a distinctly visible marking between the 2-way traffic lanes. Each of the two parallel pavements consists of a cement concrete slab, 9 inches thick on the outer portions, and 7 inches thick in the center.

PREPARATION OF ROAD-BED

As a preparation for paving operations, the compact,

macadamized road-bed was scarified to various depths, not exceeding 6 inches. The loosened surface material was then bladed, leveled and rolled. This was overspread with a 2-inch layer of ordinary river sand to serve as a cushion for the concrete pavement.

AGGREGATES FOR THE CONCRETE MIX

Following are given the classes and proportions of aggregates used: Columbia River sand, from $\frac{3}{8}$ -inch down to dust; Willamette River gravel, two grades— $1\frac{1}{2}$ -inch to 3-inch, and $\frac{3}{4}$ -inch to $1\frac{1}{2}$ -inch. A charge for a batch of concrete in the 1.1-cubic yard mixer contained the following materials by weight:

Cement, 7 sacks.....	658 lbs.
Gravel, $1\frac{1}{2}$ to 3.....	1,680 lbs.
Gravel, $\frac{3}{4}$ to $1\frac{1}{2}$	995 lbs.
Sand, $\frac{3}{8}$ -inch down.....	975 lbs.
	<hr/> 4,308 lbs.

Water per batch: 26 to 30 gallons, exclusive of the moisture contents of the aggregates.

BUNKERS AND WEIGHING HOPPERS

The graded sand and gravel were delivered by the Central Sand & Gravel Co., to the contractor's bunkers and proportioning plant near the lower end of the job. This plant, equipped with 3-bin compartments and three Johnson batchers, was built on the slope of a fill 30-feet high. The open tops of the bunkers were on a level with the new roadbed, and the 3-bin compartments extended downward, discharging through mechanically-operated gates into the three weighing hoppers, the

latter emptying their grades of material by gravity into the 3-compartment batch trucks that were loaded in a runway below.

The delivery trucks of the sand and gravel producers, each loaded with one grade of aggregate, were backed off the main roadbed onto tracks over the bunkers, and the different grades were dumped into their designated bins.

At the height of paving operations, the contractor required the use of six 3-batch trucks for supplying the paving mixer at the necessary speed; and the Central Sand & Gravel Co. kept ten trucks busy delivering graded material to the proportioning plant.

MIXING, POURING AND FINISHING

The record made by the paving crews on this job showed an average of 2,400 square yards per day of 14 hours, divided into 8-hour and 6-hour shifts, the highest single day's run being 3,020 square yards. The concreting equipment used consisted of a MultiFoote 27-E paver, with boom and bucket; and an Ord 18-foot double screed finisher.

As each 3-batch truck was backed up to the paver, there followed the regular procedure of loading the paver skip with a batch of aggregates, plus 7 sacks of cement, to constitute the mixer batch. The MultiFoote used here handled a batch of 1.1 cubic yards, making a batch run in 1.5 minutes.

CONCRETE CURING

The paving and finishing was closely followed by the



The Ord Machine Used by I. L. Young on the Canyon Road Paving Project

rapid curing of the concrete by the Hunt Process. This involves the spraying of the concrete surface with a liquid coating composed principally of Trinidad Lake asphalt, Bermuda asphalt and Gilsonite, which are first blended under high temperature, then thinned to a working consistency with a petroleum solvent. Its effect on the raw concrete is to form a waterproof, air-tight seal by which the concrete retains its moisture while curing. On this job there was applied about 1 gallon of liquid to 200 square feet of surface.

EXPANSION AND CONTRACTION JOINTS

The pavement for each roadway is provided with transverse contraction joints, 20 feet apart, and a longitudinal contraction joint along the center line. The V-shaped grooves for these, after the concrete was poured, were filled with hot D-grade asphalt. Transverse expansion joints, consisting of 1¼-inch bituminous felt strips, were placed at 100-foot intervals.

The outer margin of each paved traffic lane is flanked by a 6-foot shoulder of tar macadam, for which Gasco was used. The water collected by the gutters and catch basins is disposed of by concrete under-drains. In connection with the paving work, an Ingersoll-Rand core-testing outfit was used. The paving operations were begun July 15 and completed Aug. 23.

EXTENSION AS THE TUALATIN ROAD

During the period of Multnomah county's activities on the Canyon Road, as above outlined, the State Highway Department has had under reconstruction the Tualatin Road, which virtually means a westerly extension of the Canyon Road. The State's project began near the summit, where the Multnomah work ended, extending 3.9 miles westerly into Washington County. It begins at elevation 677 and ends at elevation 195 in the valley, making a descent of 482 feet in that distance. This section was regraded in 1928 by State forces, the roadbed having a width of 44 feet in the cuts and 40 feet over the fills.

CONCRETE PAVING

The settled road-bed, to a width of 20 feet, was paved

with concrete in the summer and fall of 1930, by I. L. Young, at the contract price of \$104,405. The first 3-foot portion, next to each outer edge, is 9 inches thick and the 14-foot center section is 7 inches thick. The job contains 46,000 square yards of paving. The pavement, as finished, has transverse expansion joints, 60 feet apart, comprising asphalt-felt strips for the depth of the concrete. The transverse contraction joints, 20 feet apart, are V-shaped grooves filled with asphalt. The longitudinal contraction joint, at the center, consists of a metal parting strip, which separates the two 10-foot lanes of travel.

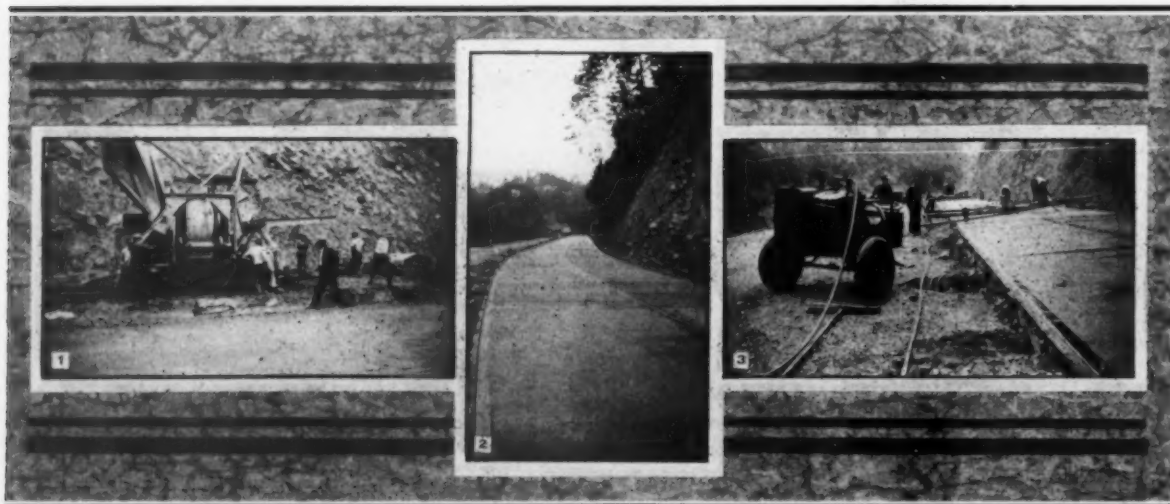
GRADES OF AGGREGATE

The aggregates, furnished by the Oregon City Sand & Gravel Co., comprised the following: Willamette River sand and gravel screenings; two grades of gravel from that company's Clackamas River plant, consisting of 3-inch to 1½-inch, and 1½-inch to pea size. The grades of aggregates for a 6-sack batch were proportioned by weight as follows:

Sand	1,100 lbs.
Gravel, 3 to 1½	700 lbs.
Gravel, 1½ to pea size	1,500 lbs.
	<hr/>
Cement, 6 sacks	3,300 lbs.
	564 lbs.
Weight of batch	3,864 lbs.

Aggregates were delivered to the contractor's Erie AggreMeter plant on the paving job, and the specified proportions were hauled to the paver in 3-compartment batch trucks. The paving equipment consisted of a Smith 27-E paver and a Lakewood 20-foot automatic finisher, the latter being equipped with one screed and a mechanical tamper.

The maximum grade on the line is 5 per cent. The paved roadway is flanked by 10-foot shoulders—6 feet of rock surface and 4 feet of earth. The work, on behalf of the State, was supervised by F. T. Young, Resident Engineer. The work on Canyon Road was the project of Multnomah County, supervised by P. C. Northrop, Highway Engineer. Harry Devereaux served as engineer and superintendent for I. L. Young, contractor.



SCENES DURING THE PAVING OF ONE OF THE OLDEST PACIFIC COAST HISTORIC HIGHWAYS
 1. The MultiFoote 27-E paver on Canyon Road. 2. A long stretch of completed pavement. 3. Curing the green concrete by the Hunt Process

A Fine Stretch of Bituminous Macadam in Mass.



ATURE faking was a favorite cry in the days of Theodore Roosevelt and now one might well start the cry, "construction faking," when one runs into a bridge job where an old 16-foot span which was 22 feet wide was legitimately widened to 40 feet between curbs but made to look as though it was 75 feet long. We have not yet guessed the real reason for the apparent lengthening, unless it was to make motorists pay more attention to it, for the structure is located at about the end of a long superelevated curve where speed will surely not be slackened unless a uniformed traffic officer is prominently stationed close by. This bit of work was done by C. I. Hosmer, of Greenfield, Mass., under a subcontract from the Kelleher Corp., who received the contract for the construction of the 13,800-foot bituminous macadam road on Route 2 between Orange and Erving, Mass., just east of the Mohawk Trail. This project was built 24 feet wide and 7 inches thick.

Work on the bridge structure and several pipe culverts was started on March 5, 1930, and the grading began April 26. The first stone went into the road on July 7 and the asphalt followed on July 9. As a large part of this job was a reconstruction project over an old road of early bituminous macadam, the stone in the base course was laid of variable thickness. In order to salvage the old 18-foot road it was used as far as possible as a foundation for the new bituminous macadam. Where the old road had been badly broken up by frost action in winter, a 10-inch foundation of gravel was put in to insulate the new surface from the possibility of frost action in the future.

The Massachusetts specifications require that, when the base course of stone for bituminous macadam is to be omitted because the foundation is good and is of such a height that only the 3-inch top is needed to maintain the grade, the old surface be broken up with the roller, not scarified, but simply by having the spikes inserted in the rolls and the machine run over the section a few times. This permits a much better bonding of the old and new surfaces.

ATURE faking was a favorite cry in the days of Theodore Roosevelt and now one might well start the cry, "construction faking," when one runs into a bridge job where an old 16-foot span which was 22 feet wide was legitimately widened to 40 feet between curbs but made to look as though it was

*Work of the Kelleher Corporation
Included
Novel Bridge Widening
by
Subcontract*

PIPE CULVERTS

There were a number of pipe culverts of reinforced concrete and vitrified clay pipe installed at various points in the project as follows:

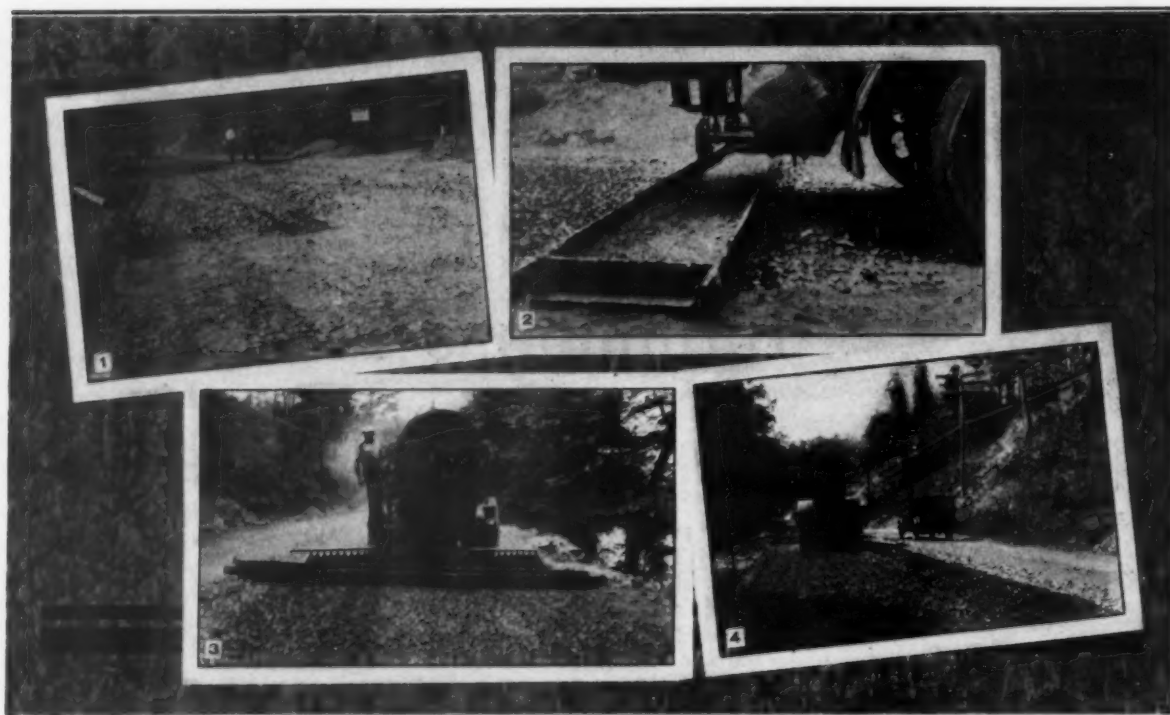
Vitrified clay pipe	
10-inch.....	200 feet
12-inch.....	500 feet
Reinforced concrete pipe	
12-inch.....	510 feet
15-inch.....	80 feet
18-inch.....	216 feet
24-inch.....	44 feet
30-inch.....	32 feet
36-inch.....	52 feet

GRADING AND FILL SPREAD WITH BULLDOZER

The grading of this project called for moving 19,200 yards of excavation, 700 yards of borrow, 2,840 yards of rock excavation and 9,700 yards of gravel borrow for the subgrade. A Bucyrus-Erie $\frac{3}{4}$ -yard steam shovel was used for all of the excavation and was then placed in the gravel pit to supply the gravel borrow. Before the Bucyrus-Erie had completed its work on the road a Lorain 75 gas shovel was used in the pit for supplying the gravel.

On the fills and for spreading the gravel subgrade a Caterpillar Thirty was used instead of hand labor. With its bulldozer it handled all of this work expeditiously.

The 2,840 yards of rock excavation was drilled with jackhammers supplied with air by an I-R portable compressor. The rock work was shallow, the holes running



PAVING OPERATIONS ON MASSACHUSETTS' FAMOUS ROUTE 2

1. In the foreground is the completed base course with the sand binder, and in the left background is the top course being rolled. 2. The drip box used to insure a clean break at the start of a new application of the asphalt. 3. The first break over the edge of the drip box. 4. Rolling the top course immediately following penetration, with the rolls wetted by sprinklers

an average of about 5 feet deep. They were shot with du Pont 60 per cent dynamite. Both the rock and the earth excavation was handled by hired trucks, the number varying from 2 to 4 with hauls averaging 500 feet and a maximum of 1,500 feet. About six men were used for work around the shovels and on the shoulders.

PLACING THE STONE

Stone for this job was supplied by the Massachusetts Broken Stone Co., East Deerfield, Mass., a distance of 18 miles average haul to the job. The hauling was handled by a fleet of twelve to seventeen trucks by sub-contract. Three trucks were sufficient to handle the gravel for the subgrade.

The stone was placed on the road to a width of 14 feet for the first strip of the 24-foot width. As the road had to be kept open for through traffic at all times, it was impossible to spread the stone the full width. One Galion spreader, 8 feet wide, was used to spread the initial part of the 14-foot strip and the remainder was spread by the trucks and forked to place by hand. This base course was laid to a depth of $4\frac{1}{2}$ inches and the labor required was one man on the spreader box and four or five men forking.

The sand binder was spread by hand immediately after the base course was rolled by one of the four 3-wheel rollers. Five men were used for the hand casting of the sand and for brooming it uniformly into the voids. The rollers, all Buffalo-Springfield machines, were one 14-ton gas machine, two 12-ton gas machines and a 10-ton steam roller.

PENETRATION OPERATIONS

Immediately after the top course of stone, spread to a depth of $2\frac{1}{2}$ inches when rolled, had been placed a sufficient distance ahead, a tank truck of Socony asphalt was run up, a haul of 9 miles from Millers Falls where the large railroad tank cars were spotted and heated by a stationary steam boiler which also supplied the steam for the jacketed pump to load the tank trucks. The asphalt was applied at the rate of $2\frac{3}{4}$ gallons per square yard for the penetration and $\frac{3}{4}$ -gallon per square yard for the seal coat.

Immediately following the penetration of the top course of $1\frac{1}{4}$ to $2\frac{1}{2}$ -inch stone, three men ran down the strip and hand cast a minimum of $\frac{1}{2}$ -inch stone over the surface for the roller to press in. After they had been down directly behind the asphalt truck they returned and lightly spread additional chips so that the large voids were filled. There is a little difference in the requirements of the various inspectors on this type of work, even working out of the same district office. On this job the resident engineer favored very light application of chips to leave a more open surface for the seal coat to bond into. One-eighth gallon per square yard was cut from both applications as in some sections there had been a slight bleeding of the seal coat in the very hot weather. It is expected that the slight reduction will obviate this trouble in the future.

The best day on this job the contractor laid 555 tons of stone but his average was 450 tons, a very good figure under the conditions of haul as regards distance and the maintenance of traffic over the road. When rolling the

penetration immediately after the asphalt was applied, all three rolls were required to be thoroughly sprinkled with water continuously to prevent the hot asphalt picking up on the rolls.

THE NATURE-FAKED BRIDGE

When an architect takes an old building and "raises its face" to look like a modern building, everyone who sees the operation marvels. There will be few motorists who will know anything about the interesting widening and lengthening of the 16-foot bridge on this project because he has hid his light under a bushel.

Four bents of reinforced concrete pile cast at the site were driven 24 feet apart. These piles were 16 inches square at the ends and tapered to assist in driving. They were reinforced with square rods and had a pipe cast in the center for jetting during driving. The piles were cast in lengths varying from 18 feet to 26 feet long and after driving were cut to grade making the final lengths from 13 feet 5 inches to 18 feet 9 inches long.

The piles were driven with a No. 7 McKiernan-Terry steam double-acting pile hammer weighing 5,000 pounds and operating at from 170 to 225 strokes per minute with the steam at a pressure from 120 to 125 pounds per square inch. The blows delivered ranged from 3,280 to 4,150-foot pounds per blow. The jetting was done with a double-acting steam pump with a 4-inch suction

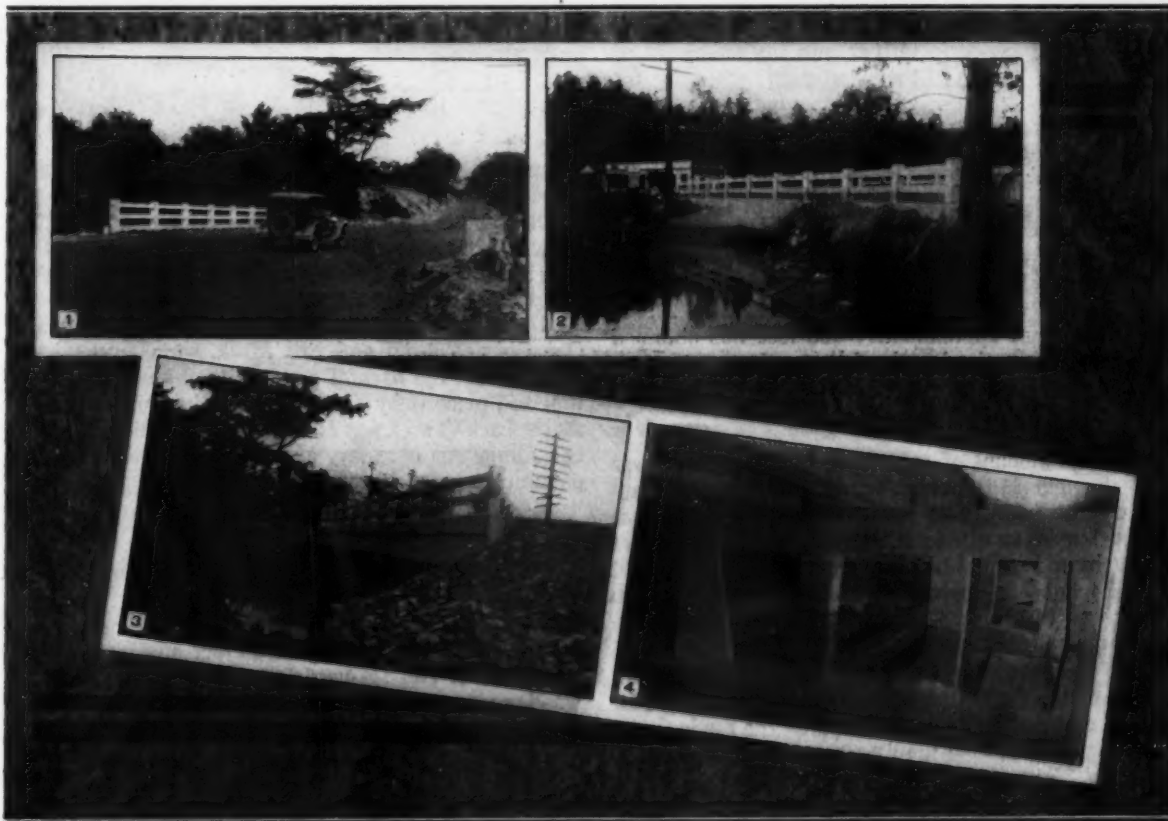
and a 3-inch discharge run by a 40-horsepower boiler and delivering the water to the pile at pressures from 190 to 200 pounds per square inch. The piles were cut off at the required grade by chipping around them with a concrete buster and then burning the reinforcing steel with an acetylene cutting torch.

The two bents at the old wing walls of the original 16-foot span bridge had three piles and the outer bents four piles. The bents were capped with concrete and then the beam construction poured using a small portable mixer. There were six longitudinal beams and the total quantity of concrete used for the bridge was 98 cubic yards.

By extending the new structure back 24 feet at either end, the bridge is apparently a rather large structure 75 feet long. As the old wing walls were completely hidden on one side and there was a large mill pond on both sides of the road no one would think the structure more or less of a "structural prevarication" unless they examined it carefully.

PERSONNEL

The general contractor for this bituminous macadam job was the Kelleher Corp., Turner Falls, Mass., for whom F. E. Cassidy was Superintendent. The subcontractor for the bridge was C. I. Hosmer of Greenfield, Mass. The work was done for the State Dept. of Public Works with H. C. VanWagner as Resident Engineer.



THE "NATURE-FAKED" BRIDGE

1. The completed structure showing the super-elevation of the left hand side. 2. The bridge as seen from the right of 1, and looking in the opposite direction. 3. The left hand side of the bridge looking in the same direction as seen from the edge of the bank. 4. A shot taken in 3½-foot headroom under the bridge showing one of the wing walls of the original structure at the left. The beam and pier structure is the widening portion

Beating the Progress Schedule

Good Organization and Short Cuts

Helped A. J. Shanks Construction Company

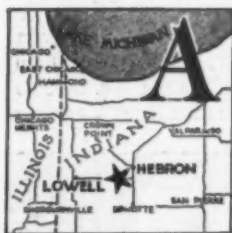
Make Envyable Record

By

Byron R. Smith

Project Engineer,

Indiana State Highway Commission



WELL organized and well managed outfit, together with an ideal location and good weather, gave the A. J. Shanks Construction Co., Watseka, Ill., sufficient opportunity to steadily forge farther and farther ahead of their progress schedule for grading, paving and placing

ing of structures on Indiana State Road 2, Project 197, between Lowell and Hebron, a distance of 10.75 miles, all of which was old location with the exception of approximately $\frac{1}{2}$ mile near the east end of the project. The contract was awarded January 27, 1930, and work started on clearing the right of way, placing of structures, and rough grading March 20, 1930. The pouring of the 18-foot 9-7-9-inch pavement started May 22. A daily average of approximately 950 feet was obtained throughout the entire length of the project.

EXCAVATION

The total amount of excavation in the contract was approximately 53,100 cubic yards of class A, and approximately 2,500 cubic yards of special borrow was obtained under an extra work agreement. All cuts were very light and several balances were 2,000 or more feet in length, but this proved to be no obstacle to moving an average of 1,000 yards of material per day for practically the entire length of the project.

Two men, operating a Monarch-75 tractor in connection with a J. D. Adams No. 12 leaning wheel grader and a Lakewood graderooter, prepared the roadway for excavation and leveled the fills into 1-foot layers when necessary. The roadway was prepared by first blading the sod outside the construction limits, then rooting the old road bed and blading the rock out of the center, so that it would not get under the belt of the elevating grader, and also to provide a place in which the elevating grader could start to plow without any delay. The 42-inch Stroud elevating grader was drawn by a

Caterpillar Sixty tractor, and the excavated material was hauled to the fill in $1\frac{1}{2}$ -yard Stroud dump wagons by 3-up mule teams. While the material was being dumped in a windrow on one side of the road, the other would be leveled to 1-foot layers and rolled with a 10-ton Austin gas roller. This crew consisted of one foreman, four operators of equipment, ten teamsters and one man at the dump.

CLEANING THE MUCK HOLE

At the center of the project there was a muck hole approximately 500 feet in length and 8 feet deep. The muck was excavated to a width of 11 feet on each side of the center line, and backfilled with clay obtained from a special borrow pit located near the west end of the muck excavation. A 1-yard Northwest crane, equipped with a Keisler 1-yard clamshell bucket, was used to excavate both the muck and special borrow. One Chicago 3-ton and two Mack 3-ton trucks were used to haul the backfill material to the muck excavation and place it by dumping from the end of the fill. As the backfill area was filled with water, this method of backfilling was necessary and was quite satisfactory in obtaining a properly compacted fill.

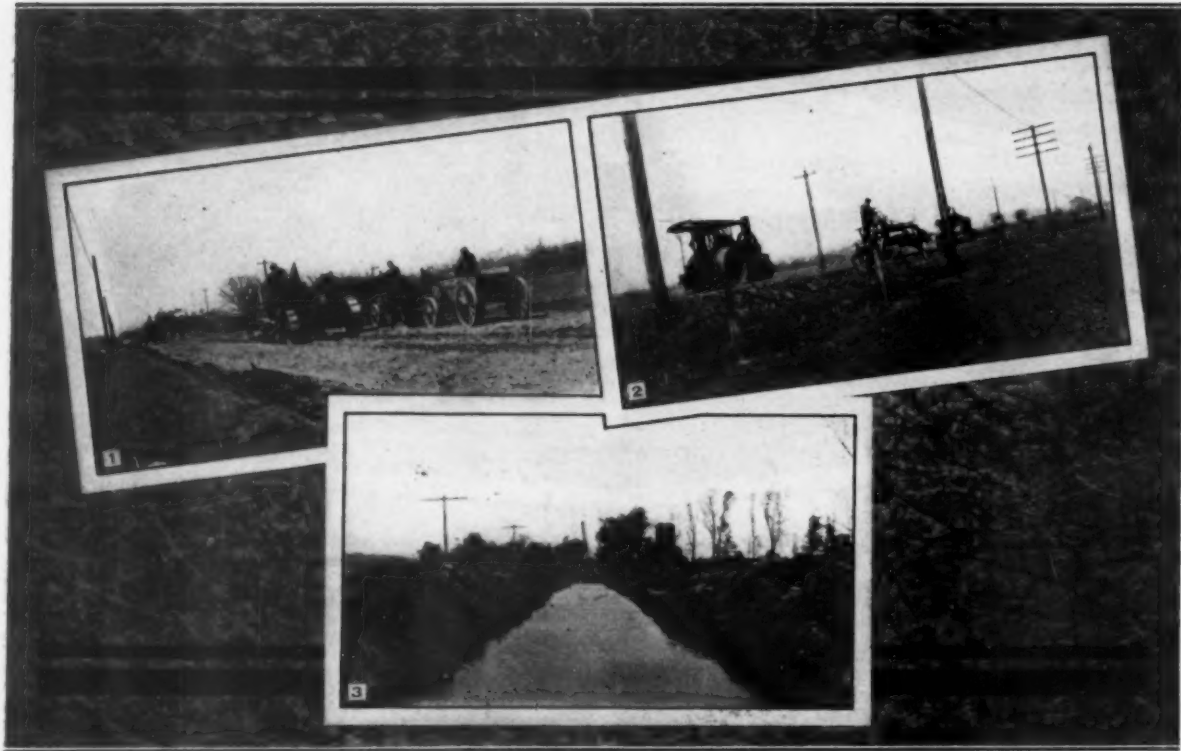
FINAL GRADE AND FORM SETTING

Ahead of the form setting a 10-foot Adams leaning wheel grader, drawn by a Caterpillar Thirty tractor was used to do the preliminary shaping of the subgrade, and when it was necessary to correct any high or low grade, one or two $1\frac{1}{4}$ -yard Baker-Maneys and a Lakewood graderooter were used in connection with the tractor to correct these variations. One man stretched the string line and operated the Carr form grader, and at all times had the form line prepared well ahead of the form setters. Six men did whatever hand work was necessary to complete the form grade, set the forms, and any relining that was necessary after the subgrader had been pulled. The two men and the equipment which did the preliminary shaping of the subgrade with the assistance of the five men who did the hand work



FINE GRADING, POURING AND CURING OPERATIONS

1. The Carr formgrader and Caterpillar Thiry with a $1\frac{3}{4}$ -yard Baker-Maney self-loading scraper, working on the fine grade. 2. A Lakewood subgrader working on the final grade. 3. Setting center joint ahead of the paver. 4. The Ord finishing machine with hand finishing behind it. 5. The two metal top floats used to remove the free water and laitance. 6. Straight-edging and placing the straw for curing. 7. Method of paving the widened portion of an intersection. 8. General view of the intersection with all forms set



PREPARING THE ROUGH GRADE

1. A general view of the rough grade operations. 2. Leveling the fill with a grader to 1-foot layers and rolling to compaction. 3. A Northwest crane excavating muck near the center of the job

on the subgrade, pulled the Lakewood subgrader for the final finishing of the grade. In order to have plenty of subgrade and form line ahead of the mixer at all times, 2,200 road feet of Metaforms were placed on the job.

A homemade planer of two 8-inch channel irons, and having both blades and scarifying teeth, was drawn by the Rex 27-E paver. This removed any variations that were left in the subgrade by the subgrader or those caused by the mixer and trucks. Immediately behind the planer and drawn along with it was a template made from a 4-inch pipe, having teeth $\frac{3}{4}$ -inch in diameter spaced at 1-foot intervals and set $\frac{1}{8}$ -inch above subgrade. Two men removed any high spots that were marked by the template, sprinkled the subgrade just previous to laying the concrete and removed the material that collected in front of the planer.

AGGREGATE AND UNLOADING PLANT

Gravel for 2 miles on the west end of the job was furnished by the Chicago Sand & Gravel Co., and stone for the remainder of the job was obtained from the McCook plant of the Consumers Stone Co. The Western Indiana Sand & Gravel Co. furnished sand for the entire project. All aggregate passed State inspection at the producing plants of these companies, and was shipped via the Monon Railroad to the end of a branch line where the contractor's unloading plant was located. This being the end of the branch line and serving only a farmers' elevator, gave the contractor an extra siding on which he could spot cement and steel. The main line was used as the material track and extended far enough to allow about 30 cars of material on a track above the

bins. The material was unloaded directly to the Johnson hopper, equipped with weighing batchers or to the stock piles, by a 1-yard Northwest crane equipped with a Keisler 1-yard clamshell bucket. Two men spotted the bucket, dropped the empties and picked the burlap and sticks out of the sand as it was unloaded.

The hauling of the batches to the mixer was sublet to the Titan Cartage Co. and the equipment they placed on the job consisted of eight International trucks of 3-ton capacity equipped with 4-yard bed and Heil hydraulic hoist, three Mack trucks of 3-ton capacity and one Chicago 3-ton truck. The trucks went first to the bins and there received the aggregate for the batch and drove approximately 100 feet away to the cement car where two men placed seven bags of Marquette cement on top of the aggregate, and then drove to the mixer, a maximum haul of 5 miles and a minimum of 100 feet. On the grade two men cut the wires and dumped the cement on top of the aggregate within 200 feet of the mixer.

In order to facilitate the handling of the cement in the car, a pit was dug alongside the track so that the top of the truck would be lower than the floor of the cement car. With this pit all the cement could be dumped direct into the trucks from the hand trucks and save the labor of handling it a second time in the car.

PLACING OF CONCRETE

At a suitable place ahead of the mixer two or three forms were removed to make a gap where the trucks could turn around. One man dumped the trucks at the

skip of the Rex 27-E paver and saw to it that all the material for the batch was removed from the truck into the skip of the mixer. Two men were used to spade along the forms, spread the concrete uniformly over the subgrade and shovel to the screed of the Ord finishing machine which was used to strike off and compact the concrete.

As soon as the machine finishing of the pavement was completed, two men checked the surface with a 10-foot straight-edge and removed any variations with the straight-edge or a 5-foot float. Approximately 100 feet back of the finishing machine, or at such a time as the free water came to the surface, the free water and laitance was then removed with a 10-foot metal top float weighing about 25 pounds, and the surface rechecked with the 10-foot straight-edge. A short time before the initial set the pavement was belted with a Lakewood delayed belter. One man operated the delayed belter, edged the pavement and, with the assistance of the man who sprinkled the burlap, placed the burlap at the proper time, using the delayed belter as a bridge from which to place it.

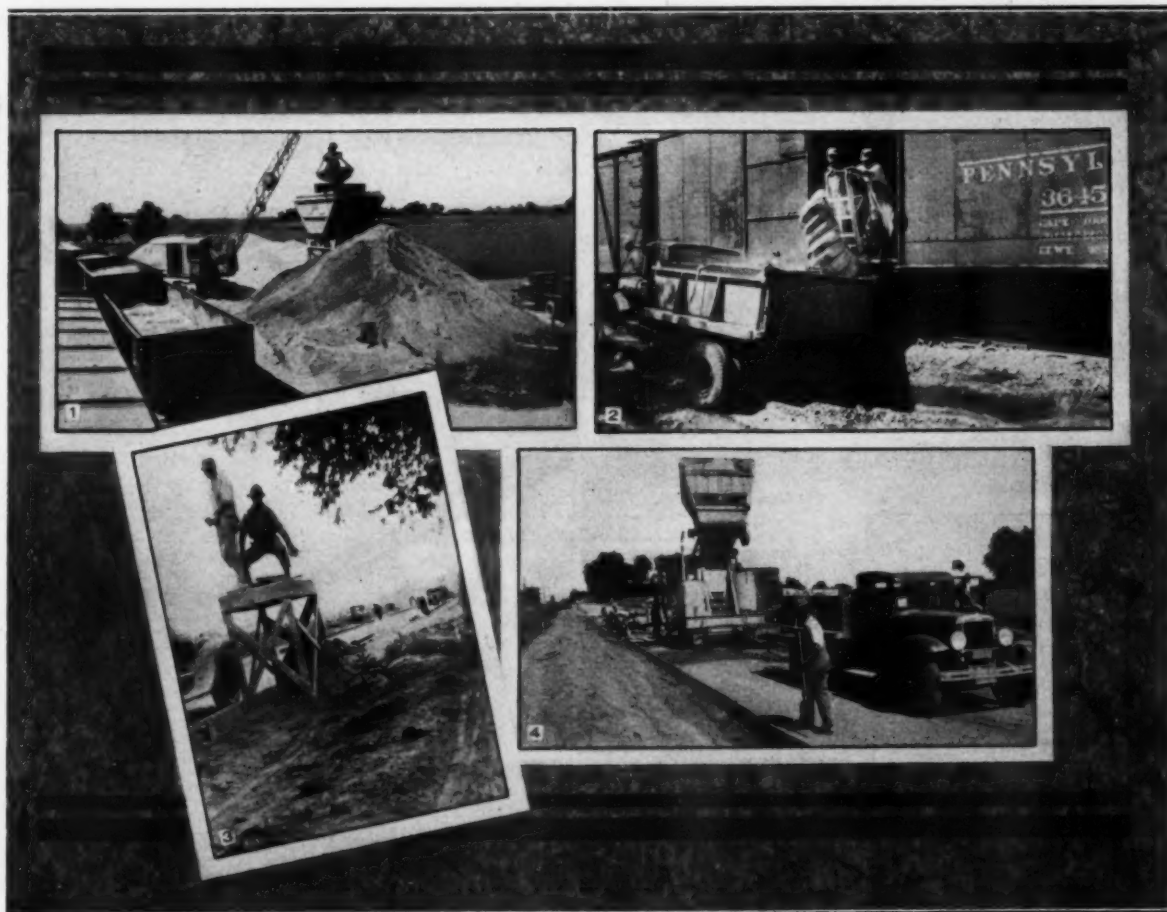
The steel was set by two men, one setting the marginal bars and, using a Hudson oil sprayer, oiled both the marginal bars and the forms ahead of the mixer, the

other set the center strip, placed the cross dowels and checked the height of the center strip by means of a string with the assistance of the man who cleaned up the subgrade back of the mixer. Two jigs that extended from the form line to the center of the pavement was used to hold the Kalman center strip in place while it was being pinned, one placed in the center of the strip and the other at the free end. Through the center strip $\frac{5}{8}$ -inch round deformed bars 4 feet long were placed at intervals of 5 feet and held in position by chairs placed on each end. The marginal bars consisted of $\frac{3}{4}$ -inch round smooth bars 20 feet long, lapped 24 inches and run for the entire length of the project. These bars were painted and allowed to dry before being brought out to be used. Over the backfill areas at structures the pavement was thickened and a sufficient amount of steel placed to carry the pavement and its load without any support from the subgrade.

CURING

One man sprinkled the burlap and kept it wet until the pavement had set up sufficiently to allow the removal of the burlap and other curing material placed. Approximately 100 feet of burlap was removed at a

(Continued on page 73)



HANDLING THE AGGREGATES

1. A general view of the unloading and batching plant. 2. There was no handling the cement a second time in the car for these men. 3. This stand saved the cement dumpers a lot of energy that would otherwise have been expended climbing on and off the batch trucks. 4. The operations around the paver

Concrete for Dam

Handled by Belt Conveyor

Northport Sand & Gravel Company

Moved 120,000 Cubic Yards

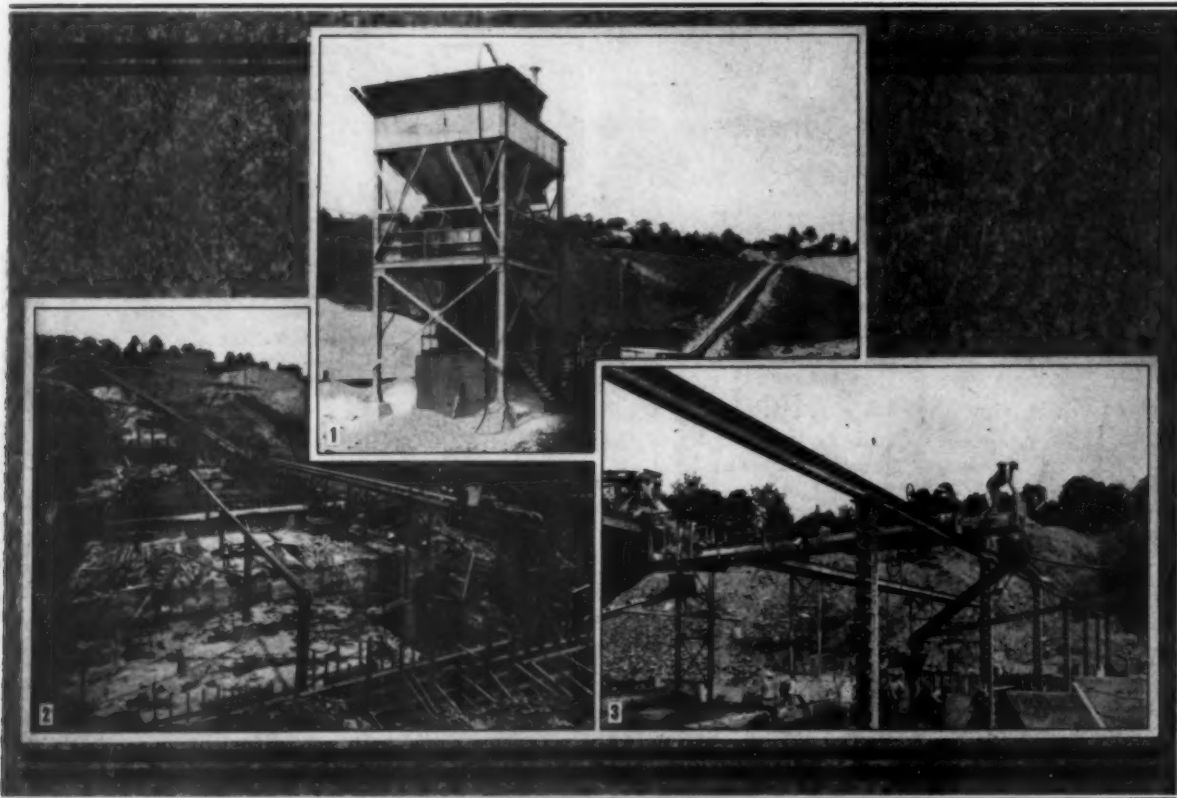
on 1,850-Foot Conveyors

Near

Wilmington, Delaware



THE City of Wilmington, Del., is building a dam on the Old Mill Stream about 6 miles from the corporate limits. The construction of this dam presents some new ideas in dam building. The dam site is a rather narrow valley or gorge, and the dam will be built from bed rock to a height of approximately 140 feet. The concrete work at the bottom, or in the valley of the stream, is 82 feet thick from the upstream to the downstream face. The length of the dam overall on the top is nearly 900 feet, and the cubical contents of the concrete will be approxi-



HANDLING THE MIXED CONCRETE ON THE NEW DAM FOR THE CITY OF WILMINGTON, DEL.

1. The batcher plant and mixer with the first belt, 850 feet long, carrying the concrete to the top of the valley. 2. The second and third conveyors with the cross conveyor shown at the far end of the level or third conveyor. 3. The cross conveyor delivering concrete to the short chute

mately 120,000 cubic yards when completed.

Fuller & McClintock, Consulting Engineers for the project, specified that the mixed concrete should not be dropped or passed through a chute where the drop was more than 7 or 8 feet. This meant that the usual system of chuting concrete could not be used.

HANDLING THE AGGREGATES

The dam is located at a considerable distance from the Baltimore & Ohio Railroad, so that the raw material had to be brought in to a point near the job. The cement, stone and sand are brought to a point about 850 feet from the dam on the downstream side, and the materials are raised into bins high enough for the aggregate and cement to flow by gravity, through a batcher into a 3-yard mixer.

BELT CONVEYOR FOR CONCRETE

From the 3-yard mixer the concrete is carried at the rate of 120 yards an hour on a 24-inch belt conveyor 850 feet long. In this distance the conveyor rises to a height of 110 feet. This 24-inch conveyor at its outer end discharges onto a 22-inch conveyor belt, which in the initial construction work on the dam ran down hill, dropping approximately 100 feet in its run. The 22-inch conveyor in turn discharges into another 22-inch conveyor running level near the lowest point of the wall of the dam. The dam at this point is 82 feet thick downstream, and it is necessary to put in a small cross conveyor feeding from the third longitudinal conveyor. The small conveyor, which is approximately 30 feet long, is mounted on a traveling bridge which moves back and forth across the concrete. The bridge and the third conveyor are all supported on a steel structure, as shown in the photograph. A very short chute from this cross conveyor on the bridge places the concrete in the forms at the point required. When concrete is brought up close underneath the bridge, the steel work is allowed to remain buried in the concrete and new columns or posts are put on top of those already erected, and the third conveyor and the traveling bridge are raised to a new position. This process is repeated over and over again and will be carried on until the dam has reached its final height.

As far as is known, this is the only dam that has been built in this particular manner. There have been other dams built in which the bridge structure was buried in the core wall of the dam or series of dams, but this is the only one where the chuting of the concrete was permitted for only 6 to 8 feet. Where it is necessary to bury the steel work carrying the bridge conveyor as well as the steel work carrying the main conveyor, this plan will be of great interest to contractors, for the reason that it is new, and also because the cost of handling the material to the dam from a mixer 1,850 feet away is so low that other contractors and engineers are studying it closely.

PERSONNEL

The Old Mill Stream Dam is being built under the direction of James B. Hill, Chief Engineer, City of Wilmington, Del. The contract for the structure was awarded to the Northport Sand & Gravel Co., Northport, Long Island, for whom the Conveying Weigher Co., Passaic, N. J., designed and built the conveyor system.

Beating the Progress Schedule

(Continued from page 71)

time and the surface of the pavement straight-edged, and any variation that was shown in 10 feet of pavement was removed with a carborundum brick. Following the straight-edging and removal of high spots, the pavement was covered with straw to such a depth that it would be at least 3 inches thick after being thoroughly sprinkled. Three men, each using 150 feet of 1-inch hose, kept the straw wet for a period of ten days. The removal of the burlap, placing of the straw and banking dirt against the edge of the pavement was done by the subgrade crew after they had completed the building of subgrade ahead of the mixer for the next day's run. After the curing period expired the straw was removed and the pavement opened to local traffic.

The water for both curing and paving was supplied by a Barnes pump through a 2½-inch or a double 2-inch pipe line having 1½-inch valves for mixing and 1-inch valves for sprinkling connections, at 200-foot intervals.

SHOULDERS

In order to have the job in such a shape that it could be completed as soon as possible after the paving was completed, the rough grade crew began to rough in the shoulders along the pavement that had been cured as soon as they finished the rough grading. The shoulders were roughed in to a width of 8 feet from the edge of the pavement, and the ditches and backslopes were cut close enough to cross section.

YIELD AND FLEXURAL STRENGTH TESTS

The amount of cement required for a cubic yard of concrete was 1.70 barrels and the variation allowed was from 1.70 to 1.72 barrels. In order to keep the content within these limits a yield test was run for each mile of pavement, or as often as a change in the characteristic of the material necessitated, by taking cross sections at 5-foot intervals along the subgrade and corresponding sections on top of the finished pavement after it had set up. An accurate count of the batches that were placed within the limits of these cross sections was kept, and the content determined.

When it was desired to open a stretch of pavement in ten days, two 6 x 6-inch test beams 4 feet long were made from the concrete of the days run governing the age of the section. These were placed along the edge of the pavement and cured in the same manner as the pavement for ten days, and at that time they were placed in a portable machine for making flexural tests and broken. The modulus of rupture on all beams was well above the 550-pound minimum which was required before any pavement could be opened.

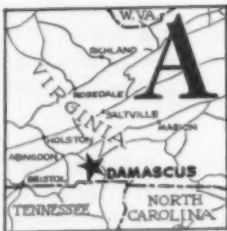
PERSONNEL

The contractor for this work was the A. J. Shanks Construction Co., Watseka, Illinois. O. G. Wilson, a partner in the company, was Superintendent in charge of all construction, and D. E. Lynch, a partner, was in charge of the office work and ordering of materials. This work was done under the supervision of the Indiana State Highway Commission, with W. E. Mendenhall, Field Engineer; B. R. Smith and L. P. Shimp, Project Engineers; Owen Fye, Assistant Project Engineer; and J. W. Manwaring, Inspector, assigned to the project.

Ledge Converted

Into Quarry

on Road Job



LEDGE of rock on the right of way may be a blessing in disguise, particularly when the bid for rock excavation is not any too high because of highly competitive bidding. At about the middle of Virginia Project 396-AC, awarded to Calhoun & Sproules, and located northwest of Damascus, Va., was a

ledge of excellent rock which had to be removed to make way for the new right of way. By simply enlarging the cut a quarry was opened which furnished all of the 25,000 yards of rock needed for the 77,400 square yards of base course for the bituminous macadam surface.

EXCAVATION CONTINUED THROUGH WINTER

Although conditions were rather disagreeable during the winter of 1929-1930, the contract which was started

Calhoun & Sproules,

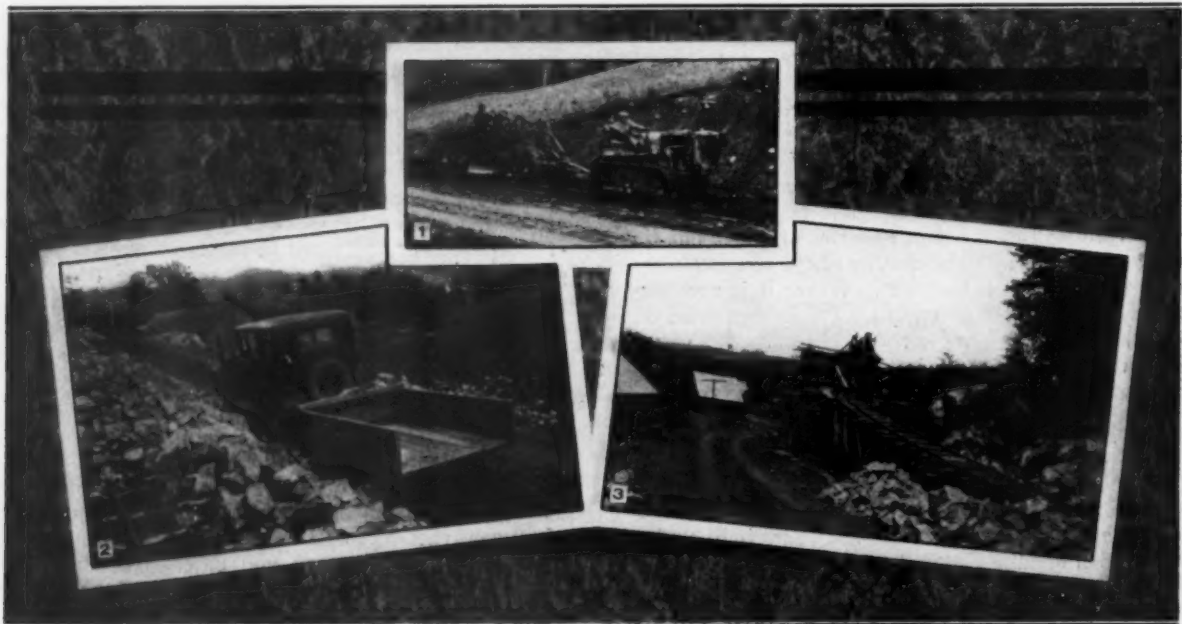
Clinchport, Va.,

Removed 25,000 Yards of Rock

on Right of Way for

Bituminous Macadam Base

on September 20, 1929, was continued throughout the winter to keep ahead of the work. This made it possible for the contractor to take advantage of the penalty and bonus clause of his contract and realize a substantial bonus by completing the work well ahead of the final date, October 1, 1930.



GRADING, AND SETTING UP THE CRUSHER ON A VIRGINIA BITUMINOUS MACADAM PROJECT

1. A Caterpillar Thirty tractor pulling an Austin Rip Snorter grader to make drainage ditches in a heavy cut. 2. The ever present Dodge pulls the new rock skip along the road to the foot of the rail incline to the crusher. 3. Set-up of the Champion crusher plant at a ledge at the side of the right of way, showing the rail incline for the skip

The contract called for the removal of 96,000 yards in cut, all of which went into fill with a moderate haul. In addition there were 10,000 yards of borrow which had to be hauled only a few stations. The contract price for both excavation and borrow under the heading of classified excavation was 49 cents. Of the total excavation about 30 per cent was rock.

All shovel work was handled by two Erie steam shovels, which loaded the trucks and dump wagons. The fill was spread by a Caterpillar Thirty hauling an Austin Rip Snorter with an 8-foot blade. The fills ran as high as 25 feet and as low as 2 feet, while the cuts ran from 46 to 2 feet. All fill was rolled in 12-inch layers when possible with one of the two 10-ton Monarch rollers.

DYNAMITE MOVED THE ROCK

A Metalweld compressor and one I-R compressor furnished the air for two Cleveland Pneumatic and four I-R jackhammers. The holes were drilled to a maximum depth of 20 feet with the average running about 10 feet. The holes were blasted with du Pont 40 per cent gelatine dynamite, about 3 tons of which were used on the work.

At the ledge which was opened as a quarry the Metalweld compressor was mounted at the top of the ledge and long air lines run down to the drills. The blasting threw the rock out onto the road, where it was handled expeditiously to the rock crushing plant.

LOCAL LABOR USED

The labor situation in Virginia made it possible for the contractor to hire local labor almost entirely for the work, so that the men were well acquainted with the terrain and lived at home during the entire length of the contract. This made for harmony and efficiency on the work. A total of 39 men were employed, including the shovel, tractor and grader operators.

COMPLETE CRUSHING AND SCREENING PLANT INSTALLED

To handle the rock blasted from the ledge the contractor installed an inclined track on which a wood skip with a sheet iron lining in the bottom was run from the bottom where it was loaded by hand up to a feeder hopper over the crushers. Two crushers, one a Champion and the other a Wheeling 10 x 36-inch jaw crusher, were installed and were run by a Russell horizontal steam engine through a crossed belt to a jackshaft, which supplied power to both crushers as well as to the bucket elevator and the rotary screens. This made a very compact plant, which supplied the rock varying from ¾-inch to 4-inch which is used in the base for bituminous macadam in Virginia. Oversize rock was sledged by a husky laborer to the proper size.

SPREADING THE BASE COURSE

The stone was hauled from the bins almost as fast as produced by the contractor's own trucks and spread on the road according to the State specifications from spreader boards and placed by hand. The base course was spread to a loose depth of 10 inches and rolled with the 10-ton rollers to a compacted 8-inch course. The

base course was sealed with ¾-inch chats and left in this shape for the State to apply the asphalt.

PERSONNEL

Both W. L. Calhoun and E. T. Sproules, of Calhoun & Sproules, Clinchport, Va., contractors on this work, were on the job all of the time, eliminating the need of a superintendent. J. R. Crill was Resident Engineer for the State, with J. M. Estes as Inspector.

Hollow Columns and Hollow Beams in Building Construction

IN the new Research and Engineering Building of the A. O. Smith Corp., Milwaukee, Wis., a unique use has been made of the hollow column type of construction. Hollow columns have been employed before in a few structures, but, so far as is known, have been utilized only as supports for buildings. In this structure, however, the interior of the column is used as a passageway to carry steam pipes, electric light wires, water pipes, telephone wiring, etc.

The girders, as well as the columns, are of hollow construction. In fact, the entire structure is a honeycomb of passageways and ducts. So extensive is the system that the transmission channels of the various kinds of energy can be quickly carried to within 10 feet of any designed point within the entire building. The passageways within the hollow columns and girders are amply large to accommodate the pipes, ducts and conduits and also to permit the free passage of workmen throughout the system for inspection, repair and the making of new connections.

The columns and girders are also used as ducts for a complete ventilating and air conditioning system, a system that automatically maintains the air in the building at a uniform and correct temperature and humidity the year round.

So far as is known, this use of the hollow column and girder type of construction is entirely original. It was developed by the engineering force of the A. O. Smith Engineering Corp., which has made so many contributions to the development of underground transportation.

A Competition for Best Elevated Tank Design

THE Chicago Bridge & Iron Works, Chicago, Ill., manufacturer of steel tanks and of steel plate work, is sponsoring a competition for improved design in elevated steel tanks. Prizes totaling \$4,000 are being offered for the best eight renderings. The first prize amounts to \$2,000, the second prize \$1,000, third prize \$500, and 5 honorable mention awards of \$100 each. Entries in the competition will consist of two drawings of a typical elevated steel tank with a nominal capacity of 200,000 gallons, a height to top of approximately 110 feet, a height to bottom of not less than 85 feet, and a riser not less than 5 feet in diameter. One drawing will include a direct elevation and two horizontal sections or plans to ¼-inch scale. The other will be a perspective drawing to the same scale.

The entries will be received anonymously, displayed in a suitable room in an impartial manner and judged by a Jury of Award consisting of Howard Cheney, President of the Chicago Chapter of the A. I. A., R. W. Zimmerman, Architect of Chicago, and George T. Horton, President of the Chicago Bridge & Iron Works.

Albert M. Saxe, 430 North Michigan Avenue, Chicago, Ill., has been appointed Professional Advisor for the competition and will handle all communications regarding it. A brochure giving complete details of the competition may be secured by addressing Mr. Saxe. The competition is open to all architects, engineers, and draughtsmen all over the world. Applications for entry will be received by the professional advisor until December 1, 1930, and the contest closes March 1, 1931.

Problems

Encountered in Making

the First Construction Census

By

Dr. Alanson D. Morehouse

Chief, Construction Section,

Division of Distribution,

United States Bureau of the Census

THREE problems are involved in the taking of any Census: namely, determining the information needed and preparing inquiries to obtain it; preparing for and making the necessary canvass of persons having the information; and compiling and publishing the information gathered.

Sounds simple! But it's easier said than done. This fact has been demonstrated very forcibly since the inaugurating of the Census of the Construction Industry. Each of the "steps" is a big task but, of course, the gathering and compiling of the information are the major steps.

Although a tentative list of questions, designed to obtain the information desired, was prepared when the movement was started for the inclusion of the Construction Census in the Current Census of Distribution, many revisions were required before a wholly adequate list was compiled. The list was revised at least ten times before it was printed in its final form about January 1, 1930.

BENEFITS OF THE CONSTRUCTION CENSUS

It is needless to detail here the questions asked as practically all contractors are familiar with them at the present time. And they are likewise aware of the many benefits which will accrue to the construction industry as a result of the Census. Suffice it to say, that among the specific benefits which may be derived from the information gathered, the following are significant:

1. It will give the individual contractor a much better idea of what his overhead costs should be, as well as the normal distribution of his labor and other costs.
2. It will give the building material dealer and manufacturer information regarding the possible magnitude of the market for various building materials.
3. It will give the construction industry in general an excellent idea of the relative size and number, and the total value of the business of various branches and trades that enter into its great and widespread activity.

LOCATING THE CONTRACTORS

With the questions prepared and printed in schedule form, the big task of the Construction Section commenced. The contractors had to be located and can-

vassed in some manner—and that has proved a real task. Naturally, our first move in that particular was to secure a list of contractors. Thus the initial list of approximately 20,000 contractors' names was obtained through the courtesy of a Bureau affiliated with one of the large national contrac-

tractors' associations. It was necessary to copy these names on cards at the office of the association. Later one of the large statistical agencies furnished an additional list of some 6,000 names. The next effort was directed toward the national and local contractors associations, builders' exchanges and various trade associations. Letters were addressed to the secretaries of these organizations requesting a list of their membership, a list of other or non-member contractors in their respective fields, and a list of other organizations in allied lines in their city. Between six or seven hundred such organizations were solicited and a second request was sent to associations which had not responded by a certain date.

Requests were then addressed to the secretaries of approximately 4,500 Chambers of Commerce or similar business organizations, and a similar second request was later sent to those who had not responded. Following this, about 4,000 letters were sent to the mayors of cities from which a sufficient number of names had not been previously received or which had not already been covered, requesting them to furnish lists of contractors in their localities. Later, a second request was sent to the mayors of those cities. In some cases requests also were addressed to the postmasters.

These various efforts covered a period of six months, from February to July, inclusive, 1930. They have resulted in a card index of about 200,000 contractors' names throughout the United States, including both general and subcontractors.

Subsequently, the list has been increased through the cooperative efforts of the National Lumber Manufacturers' Association, which secured for us through their various contacts throughout the United States the names of additional contractors; and through the checking of the classified telephone directories of a great many cities and towns. These new lists were all carefully checked with the card index to eliminate duplication

before new cards were made, so that the grand total of contractors' names listed now numbers some 225,000. However, due to various causes, the real number of contractors as interpreted by this Census, falls very much below 225,000. Some of the causes arise from difficulties in excluding duplicates; in ascertaining deaths, removals and incomplete addresses; in determining whether the correspondent is still in business or is a contractor; and in listing the same firm under each of several branch office addresses.

The card index was arranged alphabetically by states, then by cities and then by firm names. The states, and the District of Columbia were numbered consecutively from one to forty-nine. After the arrangement of the cards in each state, they were numbered serially from one to the end. Thus, the serial number of any contractor combined with the number of the respective state (for example, 14-950) facilitates the immediate identification of any contractor's card in our files. All report blanks and other instructions sent to contractors bear this individual state symbol and contractor's number for identification.

CONSTRUCTION INDUSTRY DEFINED

For the purpose of the Census of Construction Industry, repair work, remodeling and jobbing are considered on the same basis as new construction, inasmuch as such work utilizes construction materials and employs construction labor. Furthermore, the work does not necessarily have to be performed under contract, the word "contractor" having been used throughout this Census to designate any person performing construction work of any kind. These provisions have increased and complicated our work because they necessitate the locating and canvassing of many persons who do not consider themselves contractors, and are not contractors in the literal sense. But it is the construction industry we want to measure, and not contractors' work alone.



Dr. Alanson D. Morehouse

DISTRIBUTION PROBLEMS

After the contractors' report blanks, or schedules, were completed and the names of contractors secured, the problem was to get the schedules filled out and returned by each contractor. Beginning last March, report blanks, accompanied by a letter of transmittal from Wm. M. Stewart, Director of the Census, and approved by R. P. Lamont, Secretary of Commerce, were sent to all those listed in our card index, with the request that their reports be returned within fifteen days. Full instruction for filling out the report blanks were printed on the back of the letter of transmittal or incorporated in the schedule itself. Two follow-up requests have already been sent to those not responding to former requests and a fourth has been prepared for those who have ignored these.

The Construction Section started with four clerks on January 2, 1930. The force was increased to a maximum of 110 during May, but has now settled down to a regular working force of about 70 employees. About half of this number are engaged in sorting, editing, and preparing for tabulation the reports which have been received.

CHIEF ERRORS IN REPORTS

Most prominent among the misinterpretations or errors found in the reports received are the following:

1. The failure to include remodeling and repair work which, as it has been explained, are considered for our purposes on the same basis as new construction.

2. The inclusion of some lines of manufacture or trade with construction activities in some or all of the items reported, whereas only the construction part of such a combined business should be reported.

3. The report of the total value of contracts on which work was in progress, or the total value of contracts completed during the year, or only the actual cost of construction work (labor and materials) instead of the usual contract value which includes a reasonable allowance for profit and overhead, or the failure to include work performed during 1929 on projects which were still uncompleted at the end of the year, instead of the actual value of construction work performed during the year as called for by the instructions in the schedule.

4. The failure to report the actual number of skilled and unskilled workmen employed on or about the fifteenth of each month.

5. The inclusion in the item "All other overhead expenses" of amounts which are reported elsewhere on the schedule, or which are not legitimate charges against the construction part of the business.

6. The confusions of subcontract work performed by the reporting firms, with subcontract work sublet by them.

7. The failure to include subcontract work sublet in the amounts reported, under both Inquiries 14A, "Total Construction Work Performed During the Year Directly for the Owner," and 14B, "Work Performed, by Class of Ownership."

8. The failure to distribute under inquiry 14A general contract work or work performed directly for the owner by subcontractors or those engaged in special-

ized trades.

9. The failure to give the distribution by class of ownership under Inquiry 14B, or by geographic location under Inquiry 15, "Approximate Value of the Construction Work Performed by You in (a) the City, (b) the State in which your office is located and (c) in other states.

10. The inclusion in the amounts reported under Inquiry 16, value of "Materials Used and Building Equipment Installed by the Contractor During the Year" of either the cost of installation labor, or sales, or stock of materials on hand at the end of the year, or subcontract work let, instead of reporting only the cost, delivered on the job, of materials and equipment used in construction work during the year, exclusive of materials furnished and installed by subcontractors.

TABULATIONS MADE MECHANICALLY

As is almost universally known, the tabulated results of the Census are obtained by the Hollerith system of mechanical tabulation. For adaptation to this system, all information which is not already in figures must be reduced to numerical code. Thus, for example, in addition to the state and serial number of each schedule-

which has already been mentioned, it is necessary to establish code numbers for the respective answers to each of the items of general information. In accordance with these codes the corresponding items in each schedule are given their proper numbers. To insure accuracy, the work of each coding clerk is reviewed by another. After this work is completed, the schedules are sent in large numbers by state or city groups, to the general tabulating division of the Bureau of the Census where all the information to be tabulated is punched on numerical cards especially outlined by the originating division for that purpose. Eight or more of these cards, consisting either of 45 columns or 80 columns, will be required to adequately record the information contained in a single construction report.

After the cards are punched and verified they are arranged in any desired classification by running them through the sorting machine, which is the second step in the Hollerith system. The sorted packs of cards are then run through the tabulating machine which is constructed to count or summarize and record in tabular form, the information contained on the individual cards. Thus, for example, as the cards are sorted according to the various classes of general contract work and those for general building contractors are selected for tabulation, the result sheet of the tabulating machine will present a table made up of the totals for the various items on the cards by states, or by another classification desired, according to the way in which the machine is set. After the completion of any given set of tabulation sheets, they are returned to the Construction Section for use in preparing the preliminary and final reports on all phases of the Census of the Construction Industry.

In general, it is intended that the final results of this Census shall be presented in such comprehensive and yet simple form as to be of the greatest practical utility to the industry and to the public at large. Related items will be thoroughly analyzed and the resulting statistics will give as complete and accurate a picture of the Construction situation during 1929 as the information contained in the individual schedules permits.

A Modern Builder's Analysis of the Story of the Tower of Babel

IN a very interesting book "My Thirty Years' War Against Building Costs," Morton C. Tuttle, President of the Morton C. Tuttle Co., Boston, Mass., prominent builders of industrial works in New England and the East, presents a most interesting story of the history of his company from the time when he was engineer, draftsman, and estimator and then advanced to have charge of the departments of job management, engineering, cost accounting, estimating, book keeping and purchasing, until today the organization is recognized as one of the foremost industrial counselors and its advice and services are sought by manufacturers in a wide variety of fields.

Mr. Tuttle opens his book with a very interesting discussion of the failure of tribes of early days to construct the Tower of Babel. He says: "In human affairs, experience has taught me that friction usually arises from lack of mutual understanding—the want of a common language whose terms will convey identical meanings among those who employ it. This need is not to be met simply by the use of words drawn from some one accepted dictionary. Command of the same tongue is no aid to conversation between two men separated by the distance

between valley and mountain top. It is of little more avail when planes of thinking are widely sundered one from another. Yet this is just the situation in which the various parties to a building enterprise frequently find themselves during much of the time consumed in their joint undertaking.

"Being a New Englander born and bred, with an early training which included some study of the Bible, I cannot refrain from enforcing this point with a Biblical illustration, borrowed from the ancient record of the failure achieved by the mighty host assembled to construct the Tower of Babel. The account reads:

And the whole earth was of one language, and of one speech.

And they said one to another, Go to, let us make brick, and burn them thoroughly. And they had brick for stone, and slime had they for mortar.

And they said, Go to, let us build us a city and a tower, whose top may reach unto heaven; and let us make us a name, lest we be scattered abroad upon the face of the whole earth.

And the Lord said, Behold, the people is one, and they have all one language; and this they begin to do; and now nothing will be restrained from them, which they have imagined to do.

Go to, let us go down, and there confound their language, that they may not understand one another's speech.

So the Lord scattered them abroad from thence upon the face of all the earth; and they left off to build the city.

"Until I had struggled, for years, with building problems of my own, I had assumed that the breakdown of that monumental job was caused by the workmen's inability to understand their gang bosses. Beyond thinking that, in modern times, such difficulties are frequently settled by vigorous applications of a bit of scantling, and aside from admiring the frankness of the specifications for mortar, I failed to catch the full import of the narrative.

"Later enlightenment convinces me that the disorganization at Babel occurred through the failure of the designer, the appropriation committee, and the superintendent of works to comprehend one another's points of view. As I picture the event, the designer looked upon his drawings as divinely inspired objects of art—though I surmise that he worried long and profoundly concerning the correct proportional ratio between the Tower's diameter and its indeterminate altitude.

"I surmise, further, that the members of the appropriation committee, though quite incapable of reading plans, stoutly insisted upon having a high terrace completed well above floor line before the oncoming of spring freshets. Their incidental, but no less vigorous, demand that the ultimate cost of the venture should not exceed their stipulated allowance is to be assumed as a matter of course.

"Meanwhile, no doubt, the builder vainly endeavored to demonstrate that excessive speed and low cost are contradictory terms. Either plaintively or profanely he inquired as to why so much elaborate carving should be specified above the average cloud line. No literal confusion of tongues would be required to bring such a situation crumbling to disaster.

"The catastrophe of Babel has been constantly recurring ever since and in all the world. Its causes are relentlessly operative even today. And what untold costs they have entailed throughout the ages! It is against such costs that I have been conducting my 30 years war. Expressed in that way, the whole affair sounds rather futile—30 years of bucking the vast inertia developed by eons of tradition!"

Because of the American Road Builders Association Annual Convention and Road Show which will be held in St. Louis January 12-16, 1931, the January issue of CONTRACTORS AND ENGINEERS MONTHLY will devote particular attention to the subject of road building and will present an unusually interesting group of articles covering grading, brick and concrete highways and sand asphalt road construction as well as the use of diesel-powered draglines and an article on accounting.

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Differentiation Between Men-Engineers and Engineers

By

Carl W. Evans

Engineer, San Antonio Public Service Co., San Antonio, Texas

THERE are engineers and engineers! A recent survey by an editor of an engineering publication shows a variety of more than a hundred and fifty classifications of engineers. These range from the older forms, such as civil, mechanical and electrical, to even the salesman, who now styles himself as a "sales-engineer." Every year newer types are added, the newest perhaps being that of "results-engineer." But in spite of this variation in title, the entire profession might be classed under either one of two titles: engineers and men-engineers.

The greater number would, by far, fall under the classification of "engineers"—the plain, every day engineer. He might be pictured as a man once possessing a dynamic personality and individuality, but who through long and intense specialization, has allowed the trend of broader and more common things to sweep past him. His dreams are filled with cosiness and moments of force; his days with logarithms and integrals. To him the stability of a transmission line means more than the election of a president; and his interest in the development of television is surpassed, perhaps, only by the search for a name for his newest baby.

It is not intended to criticize such a man. His type has placed its contribution of benefits at the feet of civilization. The world can never overlook the advance in science and engineering for which such men as Charles Proteus Steinmetz and Elihu Thompson have been responsible. Such lives are unique in their very complete resignation to the study of science and engineering. But the fact will not escape close scrutiny that the marked degree of specialization to which most engineers and men of science subject themselves, is detrimental. A noted astronomer, after months of study, recently advanced a theory, which from the chemist's point of view was absurd. Had the astronomer possessed a knowledge of chemistry but a trifle broader, the futility of following the hypothesis under which he was working would have been apparent.

Of the "men-engineer" type there are few. Only here

and there do we find such men as Alex Dow, Samuel Insull, Harold Babbitt Smith, and Thomas Wesley Martin. These men have not allowed the grind of engineering to drag them from the battle front of civilization. They have rather brought engineering to the foreground of civic observation. The point of deviation of the lives of these men from the careers of the every day engineer was in the type of knowledge which they cultivated and assimilated. Their success was attained by developing, along with their technical training, a knowledge of the foundations of business in its broader aspects, a knowledge of economics and political affairs, in particular, and of sociology in general.

Water and Sewerage Projects in the South

PLANS are under way for a \$300,000 sewer system and sewage disposal plant for Hopkinsville, Ky., a \$65,000 project for a new water supply for Wetumka, Okla., a new filter plant and pump station at Heavener, Okla., to cost approximately \$50,000 and a new electric light plant for Wilburton, Okla., costing approximately \$55,000, in the offices of V. V. Long & Co., Colcord Building, Oklahoma City, Okla., and Nashville, Tenn. Recently V. V. Long, President, was an expert witness in the McKenzie, Tenn., Light & Power Plant case.

Construction is now under way under Mr. Long's supervision on a number of projects including water and sewer extensions at Geary, Okla., \$77,000; water works for Livingston, Tenn., \$65,000; paving at Cookeville, Tenn., \$40,000; paving in Springfield, Tenn., \$38,000; water works improvement at Marlow, Okla., \$60,000; water works in Crescent, Okla., \$15,000 and a sewer project in Prague, Okla., \$8,000.

Mr. Long read a paper before the meeting of the Southwestern Water Works Association at Amarillo, Texas, entitled "Selling Sewage Treatment to the Public."

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Harbor Work on Great Lakes

THE probable completion in the near future of the St. Lawrence Deep Waterway Project is creating much interest and activity in the ports of the Great Lakes. Many of these have instituted harbor boards as initiative bodies for port work and administration.

To assure proper and larger development of its port for commerce and industry, the Harbor Commission of Green Bay, Wisconsin, has engaged MACELWEE & CRANDALL, INC., Consulting Engineers, Cambridge, Massachusetts, to make a thorough investigation and study of the Port and to report upon a plan to be followed so that the various services and facilities may be properly coordinated and the Port have its fullest development. Dr. R. S. MacElwee is an authority on ports and port development and the author of several books on these subjects.

Consulting Briefs

Guy Wilfred Hayler, City Planning Engineer, 453 34th Avenue, San Francisco, Calif., has been engaged in the preparation of a report on the Metropolitan Development consequent on the erection of the Golden Gate Bridge, San Francisco. The bond issue for this great structure was voted on by the counties of Northern California in November.

Michael M. Burris, 15 Tenaflly Road, Englewood, N. J., is preparing plans for an athletic field and play area for the Bordentown Military Institute and also for the Bordentown, N. J., Board of Education. He is also preparing plans for play fields for the Boards of Education of New Milford, N. J., and Closter, N. J., and the construction of athletic fields for the Board of Education of Burlington, N. J., is now progressing under the supervision of Mr. Burris.

George C. Stone, Masonic Temple, Danville, Va., has recently been an expert witness in the circuit court of Southampton County, Va., in the case of W. R. Purdum and others vs. W. S. Holland.

Robert Cramer, 757 North Broadway, Milwaukee, Wis., who was formerly Chief Engineer and recently appointed Consultant for the Sewerage Commission for the City of Milwaukee has opened a consulting office in Milwaukee and is specializing in sewage and disposal plants and sewerage systems, the utilization and disposal of industrial wastes, power plant design, construction, operation, laboratory service, valuation and reports.

C. G. Wigley, Guarantee Trust Building, Atlantic City, N. J., is preparing plans for sewage pumping stations and trunk sewers for Pleasantville, N. J. He is also making an appraisal of the Normandy & Whippany Water Companies' properties. At the present time he is appearing as an expert witness in a case before the New Jersey Public Utility Commission involving a valuation and rate schedule for the Long Branch Sewer Co., Long Branch, New Jersey.

Robert W. Hunt Co., Engineers, 2200 Insurance Exchange, Chicago, Ill., has announced that John J. Cone, President and a member of that company since its organization in 1888, has retired. C. B. Nolte, Vice-President and General Manager, has been elected President and General Manager of the company with headquarters at the General Office in Chicago. J. C. Ogden, a Director and Eastern Manager of the company, has been elected Vice-President, with headquarters at New York City.

Burton Lowther, Consulting Engineer, Colorado Bldg., Denver, Colo., has recently been appointed by the Secretary of the Interior upon the recommendation of the Commissioner of Reclamation, subject to taking the oath of office, a consulting engineer in the field service of the Bureau of Reclamation to make recommendations as to the source of water supply, water sedimentation and purification, if required, the type of equipment and general arrangement of the water works, and sewerage system and disposal works. This refers to work at the Hoover dam site and a town site for 5,000 inhabitants.

J. E. Carroll, 406 Metropolitan Building, St. Paul, Minn., is supervising the construction of a \$275,000 sanitary sewer system at Robbinsdale, Minn., for which O'Neil & Preston, Inc., are the contractors.

Monograph on Hudson River Bridge

AN illustrated monograph descriptive of the principal features of the methods of construction and equipment for the spinning and adjusting of cables for the 3,500-foot span of the Hudson River Bridge at 179th Street, New York, has recently been prepared by FRANK W. SKINNER, 20 Vesey Street, New York, N. Y. These four great cables and their anchorages have just been completed at a cost of more than \$12,000,000. Each of them is 36 inches in diameter and nearly 1 mile in length and is made with more than 7,000 tons or nearly 27,000 miles of cold drawn carbon steel wire having an ultimate strength much above the 220,000 pounds specified.



Frank W. Skinner

The construction was preceded by hundreds of thousands of dollars worth of research and experimental work conducted by a staff of engineers occupied for many months with full size machinery and large scale models that developed many novel and important improvements, without which the great difficulties incident to the unprecedented span length could not have been overcome.

A notable feature was the special construction of the long span temporary foot-bridges, with a new system of storm bracing that practically eliminated vibration even in heavy winds, and permitted also uninterrupted cable spinning. Of interest also is the method of installing the temporary cables and floor platforms in connection with these foot-bridges. Another notable feature is the instantaneous control of all spinning operations from a dispatcher's office connected with eight separate signal systems covering key points of the work. Among other noteworthy points were: the universal application of electricity for all power purposes; the application of uniform tension to cable wire during spinning operations; the synchronization of wire spinning and wire unreeling; a new type of spinning wheel; positioning of the cable strands with girder cranes on the tower tops; the development of wire splices having more than 100 per cent efficiency, and the elimination of structural set in the heavy steel twisted ropes so that their elongation in service conforms to the elastic limit deformations; and the compacting of cable strands by successive operations. An article describing the construction of the New York anchorage for this bridge appeared in the April, 1929, issue of CONTRACTORS AND ENGINEERS MONTHLY.

Mr. Skinner has also prepared for publication appreciative descriptions of various types of trenching, bracing, decking and underpinning operations developed by different contractors for varying conditions and requirements.

Charles L. Wood, Columbus, Miss., was recently an expert witness in the land title case of Brown vs. Younger. Work is now under way on a 120-foot creosote pile bridge, a 75-foot creosote pile bridge, and two 50-foot steel and concrete bridges and a 1,200-cubic yard earth fill in Mississippi from Mr. Wood's designs and under his supervision.

Matthes Handling Surveys for the War Department

ABOUT a year ago GERARD H. MATTHES was retained by the Norfolk, Va., office of the War Department in the capacity of Principal Engineer to organize and supervise surveys and studies of the James River in Virginia and the Roanoke and Dan Rivers in Virginia and North Carolina with a view to ascertaining their economic development with respect to navigation, flood control, and water power. These studies and surveys, which are of a most comprehensive character, were ordered by the River and Harbor Act of January 21, 1927, and are in accordance with the provisions made by Congress as set forth in House Document No. 308, 69th Congress, 1st Session.

Since the inception of this work, Mr. Matthes was requested also to undertake the studies of the flood damage and control for these rivers called for in the Act of Congress of February 12, 1929. A total of more than \$260,000 has been allotted for his use by the Chief of Engineers, U. S. Army.

By this time, Mr. Matthes has submitted three preliminary reports under House Document No. 308 and two reports under the act of February, 1929. He estimates that it will take about nine months more to complete the final reports. A corps of about 60 men is engaged under his direction with offices at Norfolk, Danville, and Charlottesville, Va. To expedite the field operations extensive use is being made of aerial photographs. Special attention is being given to establishing the dates of early flood occurrences on these rivers and determining the probable frequencies of recurrence of floods of various magnitudes. The streams being located in a section of the United States where settlement took place at an early date, considerable information relating to flood happenings has been found in old archives, both State and private. The records extend back to the 17th century and should prove of value to hydraulic engineers. A similar study is being made of past droughts, and occurrences far more severe than the one experienced this summer are being brought to light.

The reports of Mr. Matthes are being made to Major Gordon R. Young, Corps of Engineers, District Engineer at Norfolk, Va.

It will be recalled that in 1920 Mr. Matthes undertook the survey and investigation of the Tennessee River, the first comprehensive river study to be made by the War Department, and that on that occasion he organized the first extensive aerial photographic survey to be undertaken by the Corps of Engineers in connection with river and harbor work. In 1923, he resigned from the Government service in order to engage in consulting practice specializing in aerial surveying. He took up his present assignment for the War Department in 1929.

In addition to his government work Mr. Matthes has been retained in a consulting capacity by the Suffolk County, New York, Regional Planning Board in connection with an aerial photographic survey of the County. He has also been called as a witness for the Fairchild Co. in a patent suit brought by Brock & Weymouth against Fairchild Aerial Surveys, Inc., for infringement of patents relating to aerial photographic survey methods.

Bridge Construction on the Atlantic and Pacific Coast

TWO interesting suspension bridges, one in Portland, Ore., and the other in Bucksport, Maine, are now being built under the supervision of ROBINSON & STEINMAN, 117 Liberty Street, New York City. The Waldo-Hancock suspension bridge at Bucksport, Maine, will span the Penobscot River between the towns of Prospect and Verona, near Bucksport, and thus form an important link in Maine's coastal highways and U. S. Route 1. The bridge will consist of a main span 800 feet between main towers, and two suspended side spans of 350 feet each and 540 feet of steel viaduct. The under-clearance of the bridge at the center of the main span will be 137 feet above high water. This structure when completed will be the highest and longest span in Maine.

Construction on the foundation started in August, 1930, and is progressing rapidly. Construction of the abutments, anchorages and land piers was completed in November and the two river piers will be completed about two months later. Construction of the superstructure will start in February and the entire bridge will be completed in the fall of 1931.

R. M. Boynton, who became associated with Robinson & Steinman in June, 1928, is in charge of the design of the Waldo-Hancock Bridge. Mr. Boynton is a graduate of the University of Maine and a former resident of that state. Upon graduation from college he joined the staff of the Engineer of Structures of the Erie Railroad Co., where he gained a wide experience in the design of highway and railway bridges, transfer and ferry bridges, pedestrian subways, piers, docks, warehouses, coaling stations, and other miscellaneous structures associated with railroad work. He assisted in the design of many grade-crossing elimination projects, notably those at Paterson, N. J., Jamestown and Buffalo, N. Y., and Akron, Ohio. Since joining the Robinson & Steinman organization, Mr. Boynton has assisted in the design of the Mt. Hope Bay Bridge at Bristol, Rhode Island, the Bear Creek Bridge at Sparrows Point, Md., and the St. Johns Bridge at Portland, Ore.



R. M. Boynton

Engineer to Develop Coordinated Transportation Plans for Sioux City

THE City of Sioux City, Iowa, has employed ALONZO J. HAMMOND, 120 South La Salle St., Chicago, to devise plans for the rearrangement and reorganization of its railway freight and passenger terminals, separate grades, etc., to coordinate with State-Federal highways and streets, and a 300-acre industrial layout on the water-front where navigation service is being developed.

This is the most comprehensive development growing out of the creation of the inland waterway system.

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SEVERAL sewage disposal plants and water supply projects are now being designed or are under construction from the plans of CONSOER, OLDER & QUINLAN, 205 W. Wacker Drive, Chicago, Ill., according to Arthur W. Consoer. This work includes plans for sewage disposal plants at Huron, S. D.; Sauk City, Wis.; and Sparta, Ill. Water supply improvements are being planned for De Kalb, Ill.; Mount Prospect, Ill.; and several other communities. In addition a city plan and zoning plan are being prepared for Belle Ville, Ill.

Consoer, Older & Quinlan have acted as expert witnesses in the case of U. S. F. & G. vs. Fox Point, Wis., the Jacksonville Flood Control Case, and the case of Hazel Crest, Ill., vs. Pronger Bros.

A number of projects are now under construction from the plans of these consultants including sewerage systems at Owensboro, Ky.; Niles Center, Ill.; Niles, Broadview, Westchester and Calumet City, Ill.; and water supply projects at O'Fallon, Ill., and on the Grigsly Estate at Barrington, Ill.

Diversified Works Engage N. J. Engineer

PLANS for a plan for the disposal of creamery waste at Califon, N. J., and for subdivisions with improvements at Oradell, Teaneck, and Englewood, N. J., are included in the present work of MYRON HENDEE, 210 Main Street, Hackensack, N. J. Mr. Hendee was called as an expert witness in the case of Sprague vs. Eypper & Beckman in the interpretation of a boundary description; in the case of Linstra vs. Higgins for ejectment proceedings; and the case of Pepkovitz vs. Harrison, a suit for damages for an alleged error in a survey. A \$50,000 road project was recently completed in Ridgewood, N. J., from plans of Mr. Hendee and under his supervision.

Various Projects in the South

AMONG the projects being planned in the office of the C. N. HARRUB ENGINEERING Co., 705 Fourth and First National Bank Bldg., Nashville, Tenn., are paving for Aberdeen, Miss., water supply for Wartrace, Tenn., and sewer extensions for Dawson Springs, Ky., the construction of which is being supervised by this firm.

This company recently completed the construction of a \$50,000 water works improvement, a complete sewerage system costing about \$70,000 and 25,000 square yards of concrete paving and have completed plans for the paving of 45,000 additional square yards for Houston, Miss. Murfreesboro, Tenn., is spending, under this firm's supervision, about \$250,000 in water works improvements. The principal items are two new 150-horsepower boilers with stokers, an 8-foot radial brick chimney, two unaflo engine-driven 150-kw generators with panel board, etc., a 2-mgd rapid sand filtration plant with a 1,000,000-gallon clear water reservoir, new high and low service centrifugal pumps and a fire pump, a 500,000-gallon elevated storage tank and about 4 miles of 12, 8 and 6-inch feeder mains.

Paving and the construction of a sewage disposal plant and outfall sewer for Lewisburg, Tenn., the plant to consist of an Imhoff tank, 23 x 42 feet and the sewer of 18-inch vitrified clay pipe, is another project.

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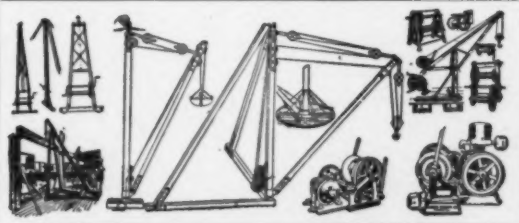
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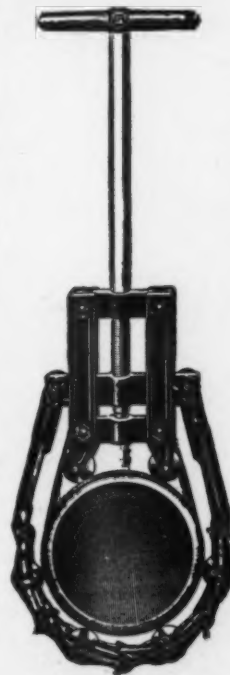
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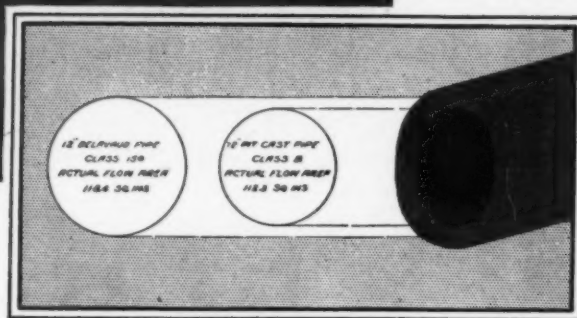
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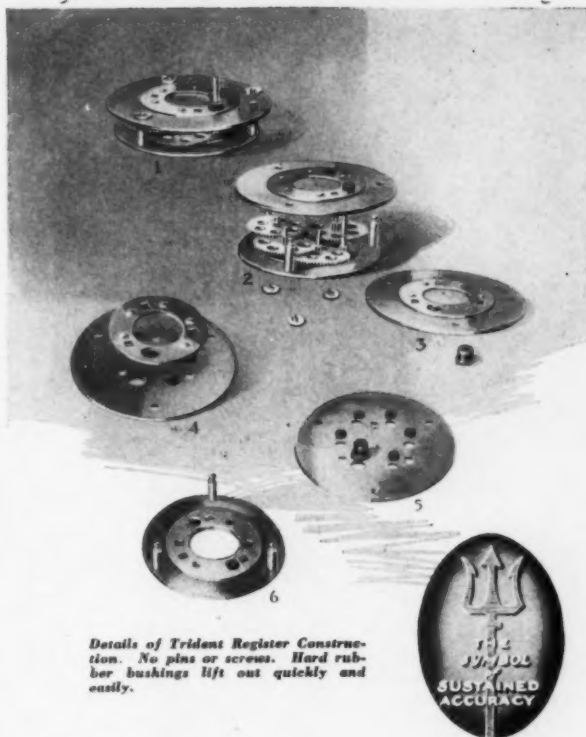
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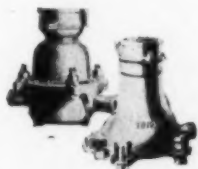
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The Editor Comments —

Makeshift Road Rollers

When it is specified that a contractor shall use a 10-ton or 12-ton roller, steam or motor driven, to roll fill on a road job or for the embankment of an earth dam, it is normally expected that the contractor will use some standard make of road roller, the work of which is well known through past performances. You have probably noticed, as I have, that some of the home-made affairs which have made their appearance in various parts of the country where old steam type tractors loaded down with junk have been estimated to approximate the effectiveness of well-designed and well-built rollers. Such equipment as this, unless subjected to the most rigid tests to prove that it is as effective as well-designed equipment should be ruled off the job. We know of no progressive contractors who would consider this type of machine.

Perhaps the single exception to the rather sweeping statement in the preceding paragraph is where some old Fordsons have been converted into rollers, for use between the forms, by filling their wheels with concrete. In practically every instance where these have been used, the weight has been greatly in excess of the minimum specified.

The Use of Crawler Tractors for Compacting Fill

There is now a group of engineers which believes that the crawler type tractor can be used effectively in compacting fill and at least one large earth fill dam has been using this type of equipment for compacting the fill. These engineers have made a very careful study of roller pressure and of the density of the fill and are fully convinced that the crawler-type tractor can be used effectively in this work. On the other hand, manufacturers of crawler-type tractors constantly feature the comparatively light pressure of the crawler tractor on fill as an effective sales argument, particularly where the soil is unstable.

One is led to believe that these two arguments are very highly opposed until proper consideration is given to the kneading action of the crawler tractor and the vibration of the soil by the tractor as it passes over a given area. Both kneading and vibration are most effective in consolidating loose soil as evidenced by the two most effective devices known today for this work, the "sheepsfoot" roller and the pneumatic vibrating or tamping machine. It is still believed, however, that most careful consideration must be given to the type of soil to be compacted and after proper experimenting by the engineers the best method for the particular soil will be found.

Further Comments on Longitudinal Floating

So many favorable comments have been received on the discussion of longitudinal floating as the best

method yet devised for finishing concrete roads, which appeared on page 93 of the October issue of *CONTRACTORS AND ENGINEERS MONTHLY*, that I am going to call the attention of county and state officials to the number of states which require the longitudinal float as a method of finishing or permit it as optional with the contractor. An analysis of the concrete road specifications of the 48 states and the District of Columbia used during the construction season of 1930 shows 27 states on the Honor Roll requiring that contractors finish the road with a longitudinal float to insure a complete ironing out of the myriads of miniature bumps which are bound to remain after the finishing machine, even when operated most effectively and on forms laid on the best foundations, has completed its work. There are also two states, Missouri and Utah, in which the longitudinal float is optional with the contractor.

The states on the Honor Roll are: Alabama, Arkansas, California, Colorado, District of Columbia, Florida, Idaho, Illinois, Iowa, Kansas, Louisiana, Minnesota, Mississippi, Montana, Nebraska, Nevada, New Mexico, North Carolina, Oklahoma, Oregon, Pennsylvania, South Carolina, Tennessee, Texas, Washington, West Virginia and Wisconsin. It is most truly hoped that in the interests of smoother riding roads at least the number of states in which the use of longitudinal floats is optional may be increased and that contractors will realize that by using the longitudinal float, they will be building reputation.

Are You Willing to Climb for Five Years or Do You Want Government Control?

In a direct challenge to business leadership Virgil Jordan in an address before the Railway Business Association, made the following remark, "Though the tremendous recuperative power of the United States will bring us and the rest of the world out of this depression and back to fairly normal levels toward the end of 1931, the next five years will be a critical period in American business history. It will decide whether our business system based on private initiative and cooperative effort is going to be willing and able to accept and discharge its responsibility for long-term planning of stable business growth or whether the public, through the extension of methods and agencies of governmental control of business, will have to step in to protect itself against recurrent loss and hardship due to short range thinking on the part of business and financial leaders."

We believe in the stability of business based on private initiative without injecting increasing doses of paternal governmental control into private enterprise.

Theodore Reed Kendall

Legal Points for Contractors

These brief abstracts of court decisions in the contracting field may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt consult your own attorney

Edited by A. L. H. Street, Attorney-at-Law

Haulage Contractor Held to Have Good Claim for Breach of Agreement

"Mr. Haulage Contractor, we will pay you \$1.25 for each five-sack batch of materials you haul out to the Whittier boulevard job, you to haul all the materials required on the job," said a gravel company. The offer was accepted and the haulage contractor procured the trucks necessary to enable him to perform the contract. But later the gravel company failed to comply with its part of the contract, and the haulage contractor sued for damages.

"The haulage contractor is not entitled to recover in this case," argued the subcontractor's lawyer, "because the contract provided that he was not to be paid for hauling unless the subcontractor, my client, should be able to get the money from the general contractor. That may have been an unwise thing for the haulage contractor to agree to, but he did, and that is the end of it. Who can say that if the materials had been hauled pursuant to our contract we would have collected from the general contractor and therefore been able to have paid for the hauling?"

"That doesn't 'listen good' to us," said the California District Court of Appeal in the case of *Morrison v. Sycamore Canyon Gravel Co.*, 283 Pac. 84.

The foregoing is an imaginary conversation, but it embodies the substance of what was agreed upon and what actually happened. In holding that the gravel company was liable for breach of the agreement, the court really said:

"The absolute repudiation of a contract by one of the parties thereto precludes him from subsequently resorting to a condition delaying the time or designating the source from which he expects to procure the funds with which to meet his obligation, merely as an excuse for escaping his liability. Such condition will furnish no defense to a suit for damages for the breach of the contract. A party to a contract may not take advantage of his own act or omission to escape liability."

Disregarding a Specification Entailed a Heavy Loss

A subcontractor delivered rail steel bars for use in reinforcing contract work, but they were rejected because they were not billet steel. He sued for the price, and the general contractor claimed damages offsetting the contract price. The Louisiana Court of Appeal allowed the offset, in the case of *Raymond v. Davis*, 125 So. 182. The damages allowed embraced increased price that the general contractor had to pay for steel of the kind called for by the contract, plus the cost of handling the rejected steel, etc. Concerning the subcontractor's position, the court said:

"Whether he overlooked the requirement of the specifications, or whether he thought he could convince the Dock Board that rail steel was just as good, we are unable to say. All that is important is that, had he carefully read the letter, or had he carefully checked the specifications, he would have seen that rail steel would not do. He was an expert in matters of that kind and his oversight caused the loss. He is therefore responsible for it."

"One Strike and Out"

There is some analogy between baseball and labor disputes, although it takes three strikes to call one man "out" on the diamond, while a lot of men can be called out in one strike in industry. The analogy lies in the fact that although the rules concerning strikers are very simple, both in the great national game and in walkouts, the "players" are not always pleased with the decision of the "ump." Difference of opinion may exist as to whether or not there has been a "foul" in a labor dispute, as well as in a baseball game.

Everybody knows the law of baseball, but few know just what the Law sanctions in the way of strikes when an employer claims a "base hit." So let us read this very clear and concise statement made by Justice Taylor in the case of *Willson & Adams Co. v. Pearce*, 237 N. Y. Supp. 601, as to what striking employees may do and yet stay "within the law":

"Either employer or workman, where the employment is for no fixed period, may terminate the contract; the workman's right to quit is absolute; no one may demand a reason therefor; what he may do alone he may do in combination with others provided they have no unlawful object in view; workmen have a right to organize to secure higher wages, shorter hours of labor, and to improve their relations with their employers; they have the right to strike, if the object is not to gratify malice or inflict injury upon others, but to secure better terms of employment for themselves; a peaceable and orderly strike, not to harm others, but to improve their own conditions, is not illegal."

Premises Covered by Lease

Contractors leasing office quarters will be interested in the experience of a Detroit general contractor. He secured a lease on premises described as a "store located at 11033 Grand River Avenue." Controversy arose as to his right to use vacant ground adjacent to the rear of the building. The dispute resulted in a lawsuit and the general contractor lost. Then he knew that he should have insisted upon the lease being so worded as unmistakably to include the ground as well as the building.

The Michigan Supreme Court decided (231 N. W. 103) that ordinarily lease of a store building includes only so much of the lot on which the building stands as is necessary for complete enjoyment of the building for the purpose for which it was let. But the court adds:

"It would make some difference whether the rear lot was fenced or not; whether it was situated in a sparsely settled community; whether the purpose of the business was such that would necessitate the use of such vacant space in the rear, as for shipment and delivery of goods by the lessee of the store; whether the rear lot fronted on an alley or a street; whether the street was an important one; whether the rear of the store fronted on a corner lot; what the lease itself provided; whether there were other stores whose tenants might also claim the rear lot."

Obviously, description of the premises as a certain numbered lot, or the addition of the phrase, "including all ground in rear of building," would have secured use of the vacant land by the tenant in this case.

Maintenance Guaranty Held Not Limited to Defective Materials or Workmanship

"Please let us have a warrant for \$5,486.20," said the street improvement contractor to the city of New Orleans. "That is the balance you have retained under our contracts for the construction of curbing, sidewalks, gutters, etc."

"Yes, but you have got to do some repair work before you get any of that 'jack'," answered the city. "Are you so forgetful as to fail to remember that your contracts contained a clause to the effect that you would 'maintain in good order and condition' all the work you have done for two years? Here is a list of defects that developed within that period."

"But those defects resulted from soil conditions, not from any fault on our part," replied the contractors.

A lawsuit followed and the city was upheld in its contention that the maintenance clause was not limited to defects resulting from defective workmanship or inferior materials. Referring to the contract clause in question, the Louisiana Supreme Court said in an opinion handed down January 6, 1930 (*Fresh & Oliveira v. City of New Orleans*, 126 So. 214):

"This provision is broader than a mere guaranty to remedy defects resulting from inferior workmanship or the use of defective material, appearing within the two year period. It goes beyond this and includes the obligation to maintain the work in good repair for the required period, whether or not the repairs are required because of defects in the workmanship or because of the use of inferior material."

"To avoid the difficulties arising, defendant has, by the foregoing provisions, provided, as an incident to obtaining proper pavement or other similar work, that the contractor shall repair any defects in the work arising during the maintenance period, at least under ordinary usage, whether or not the defects are due to a failure to comply strictly with the specifications or to other cause."

"Plaintiff is charged with knowledge that there was danger of subsidence occurring in the work at places, for the specifications made it plaintiff's duty, before bidding, to investigate the conditions to be encountered, and the fact that there was danger of subsidence, was a condition easily ascertainable. Presumably, plaintiff took into consideration this particular danger to be encountered and based its bid accordingly. We think that it is plaintiff's duty to correct the defects."

Assignee of Contract Not Liable for Material Previously Delivered

When a chap is given a rose he sometimes must take care that a hidden thorn does not stick him. So, too, the acceptance of the benefits of a construction contract usually carries with it such disadvantages as inhere in the transaction.

But in the case of *Hargraves v. Maryland Casualty Co.*, 286 Pac. 231, the Kansas Supreme Court, in an opinion filed April 5, 1930, decided that a company that accepted an assignment of an uncompleted building contract did not thereby become obligated to pay for materials that had been furnished for construction of the building, and actually installed in the structure, before the assignment was executed. The decision turned upon the point that the assignee signed nothing and that the assignment contained no recital of the assumption of such obligations.

Title to Materials on Unfinished Job

That a contractor may have abandoned a building job, or that the work may have been taken over by the owner for a default, does not necessarily carry with it an abandonment of unused materials remaining on the premises. And this is so, even though the contract contains the customary provision for taking over and completing the work by the owner on breach of the agreement by the contractor.

Said the United States Circuit Court of Appeals, Fourth Circuit, in the case of *Commercial Casualty Insurance Co. v. Williams*, 37 Fed. 2d, 326, a case involving a contract for erection of a county building:

"The mere fact that the county had the right to take possession of the premises and complete the work did not give it title to the materials which were on the ground and which had been purchased by the contractor. The title to these materials had vested in the contractor and not in the county, and the mere fact that the contractor breached his contract did not operate to vest the title to the materials in the county or give the county a lien thereon."

When Employees Are Lent Temporarily

Under modern construction practices, when a contractor or subcontractor borrows equipment and men to operate the same, important legal questions frequently arise as to who is the "employer," for the time being, for the purpose of determining liability for injuries that may be inflicted upon third persons through the employee's negligence, or that may be sustained by the employees themselves.

A case illustrating the practical difficulties that arise under this head was lately decided by the California District Court of Appeal (*Valdick v. Leclair*, 289 Pac. 673.)

A building contractor hired a tractor and hoisting attachment from a hoisting contractor, for a certain sum per day, including the wages of a man also furnished to operate the outfit. This man was injured and question arose as to whether he must look to his general employer, the hoisting contractor, or to the building contractor to whom the hoisting contractor temporarily lent him.

The court decided that a jury that tried the injured man's damage claim would have been justified in deciding that the general contractor or remained liable. The court said that the decisive point was whether the hoisting contractor had retained control over the employee, or temporarily surrendered that to the building contractor.

Damages for Inferior Brick Used

"The brick will hold their color," guaranteed a material man. But after they had been put into the walls of a house, from one-third to one-half of the brick became discolored.

The owner of the house thought that he had a good damage claim against the seller as an offset against the unpaid purchase price. This resulted in a lawsuit, and the lawsuit resulted in a decision by the Texas Court of Civil Appeals (*Acme Brick Co. v. Turpin*, 22 S. W. 2d) that the jury that tried the case did substantial justice in deducting one-half of the price of the brick as damages on account of their failure to hold their color.

Determining Damages Due for Defects

When a structure erected by a contractor is defective, and he is at fault, what sort of measure is used by the courts in determining how much money he must pay the owner?

This question was answered by the Texas Court of Civil Appeals in the case of Roberts v. Roberts, 27 S. W. 2d, 880, in which the inquiry was specifically applied to a contract for the construction of a grain elevator. Said the court:

"For the breach of a building contract, if the defects which constitute the breach can be remedied without impairing the building as a whole, the measure of damages is the difference in the value of the building as constructed and its value had it been constructed according to plans and specifications."

How the Other Fellow Did It

Construction Briefs

Modern Carryall Proves Big Boon on Concrete Job With Industrial Railroad

61. Ahead of the paver on an 8-mile concrete paving project in Ontario was a platform mounted on eight wheels and used to carry several drums of gasoline, oil, a pile of center strips and pins for setting them, extra rubber boots, an extra subgrading template, sledges and miscellaneous tools. The platform was 20 feet across as it rode the forms on grooved wheels and was about 6 feet wide. It was kept about 120 feet ahead of the paver and moved by several men as the paver approached it. Every night any loose tools found on the subgrade or on the shoulder behind the paver were thrown onto the carryall by the watchman and thus were ready for use in the morning instead of being lost as so many tools are on rapid paving work. Such a device would not be of any value on a job where truck haulage was used, as it would interfere with the trucks reaching the paver.

19.3.66

Shooting Tap-Rooted Stumps

62. A radically different method for shooting tap-rooted stumps has recently been developed. This method speeds up the removal of this type of stump, of which the southern pine is typical, especially in sandy soil. It was originally developed for clearing right-of-way for pipe lines, but has since proved effective in other types of work. The simplicity and effectiveness of the procedure may be readily understood by reference to the accompanying drawing which shows the location of the loaded holes.

A considerable number of gumwood stumps, ranging in diameter from 24 inches to 72 inches were recently shot in this manner. Hole Number 1 was loaded with from 1 to 6 sticks of Agritol and shot first, blowing out the soil as indicated by the dotted line. Hole number 2 was loaded with from 12 to 52 sticks of Agritol and shot next. The proper timing of the shots was controlled by the use of a longer length of fuse for the second hole. Both fuses are lighted at the same time and it is important that the blaster use sufficient fuse to allow himself time to light both fuses and withdraw to a safe distance.

It is quite evident that the removal of the earth from one side of a stump by the first, or "relief" shot, greatly assists in permitting the second, or "lifting" shot, to throw the stump out of the ground.

DP 10.27.30

Safety Around the Crusher

63. On a large sand asphalt plant in Ontario, Canada, particular care was paid to the safety of the employee. A substantial ramp was built with a platform of sufficient size for the truck hauling the sand and gravel from the pit to drive up, cramp the wheels and drive to the rail screen. The edges of the ramp were curbed with large birch logs for safety. The rail screen to let the fines through was made with 20-pound rails with the flanges burned off and spaced with pipe bushings. The coarse material went down the screen to a gyratory crusher which had a side discharge to a bucket elevator which also handled the fines from the rail screen. The platform had stairs so that it was not necessary for anyone leaving the screen to walk into the path of a truck coming up or leaving the platform.

19.3.53

A Portable Scraper Outfit Makes Long Highway Cuts

64. On a cut and fill job in Leelanau County, Michigan, it was necessary for the contractor to cut through the crest of one of the sand hills and to use the spoil to build up the grade across the adjacent valley. The cut was 300 feet long, 200 feet wide at the top and about 42 feet deep. The fill was about 350 feet long, 200 feet wide at the base, and sloping down from a height of about 47 feet where the fill joins the cut in the hill. The total yardage handled was about 50,000 cubic yards, the material being sand with a high content of moisture. A 1-yard portable scraper outfit, with its gasoline driven power unit mounted on a road truck handled this entire section of cut and fill. It was operated usually on a span of 400 to 500 feet and was shifted as required to reach all parts, both of the cut and of the fill. Three men, a foreman, the hoist operator, and a helper, constituted the entire crew for this job.

SN-10.30

A Switch a Mile on Industrial Railway Job

65. On a 5½-mile concrete paving job which was handled with an industrial railway, five switches were maintained for the trains of cars. At the paver, a scheme for saving time while the trains were switching and thus preventing any loss of time, was used. When a train arrived at the paver, it moved along until the last two or three cars were reached. These were then cut off and the train run down past the next switch behind the paver. The train then waiting on the switch ran up and by that time the two or three cars had been moved along by hand and the batches emptied into the paver. This train then picked up the cars with their empty boxes and started back to the batching plant, while the train which had dropped the cars moved into the switch to be ready to pick up the cars dropped by the next train. In this way and by varying the number of cars dropped to suit the distance the train had to move to the switch behind the paver, much time was saved.

19.3.67

A Novel Hose Connection

66. In these pages we have mentioned the use of a double connection used by some contractors at the paver. One type of connection which an Illinois contractor has found most advantageous and which he states has eliminated trouble so completely that he has not lost a batch since the device was installed, is of particular interest.

Instead of the usual hose coupling, he has substituted air brake hose connections on the water line tap and on the end of the paver hose that is connected to the tap on the line. Thus, the same hose is used all the time and is never disconnected from the paver. With the air brake hose on the tap being used and another on the next tap all is set for the shift. When the hose is reaching the end of its usefulness from one tap, the concrete foreman gives the signal for the fine grade gang to shift hose.

When the skip goes up and the paver man opens the water valve to the drum which automatically shuts off the inlet, a man at the tap to which the hose is connected simply breaks the air hose connection while another man closes the valve on the water line. About 7 men grab the hose and run as fast as they can to the next tap where a man grabs the air hose on the end of the water hose and makes up the connection almost instantly with the air hose on the tap without a wrench.

19.3.82

Construction Industry News

Trackson Co., Milwaukee, Wis., has appointed the following distributors to handle its line of crawlers, shovels, hoists and bulldozers: Steel Products Corp., El Paso, Texas; Allegheny Equipment Corp., Grant Building, Pittsburgh, Pa.; Concrete Machinery & Supply Co., 777 E. Gage Ave., Los Angeles, Calif.; H. O. Penn Machinery Co., 140th and East River, New York; Hunter Machinery Co., Detroit and Grand Rapids, Mich.; H. W. Moore Equipment Co., 6th and Acome Sts., Denver, Colo.; Gierke-Robinson Co., 4th and Ripley Sts., Davenport, Iowa; Browning-Ferris Machinery Co., 205 Exposition Ave., Dallas, Texas; Carolina Contractors' Equipment & Supply Co., Inc., Box 576, Columbia, S. C.; Kern-Limerick, Inc., 115 No. Spring St., Little Rock, Ark.; R. B. Everett & Co., 3112-18 Harrisburg Blvd., Houston, Texas; Northwest Equipment Co., Inc., Box 112, Great Falls, Mont.; G. C. Phillips Tractor Co., Inc., 1625-31 Ave. B, South Birmingham, Ala.; R. S. Armstrong & Bros. Co., 676 Marietta St., Atlanta, Ga.; A. E. Hudson Co., 311 Franklin St., Peoria, Ill., and Service Supply Corp., 20th and Venango Sts., Philadelphia, Pa.

LaPlant-Choate Manufacturing Co., Cedar Rapids, Iowa, has appointed the following new distributors: Tractor & Thresher Co., Ltd., Saskatoon, Sask., Canada; Mississippi Tractor & Equipment Co., Jackson, Miss.; Yancey Tractor Co., Albany, Ga.; McDonald Tractor Equipment Co., Orlando, Fla.; and Yancey Bros., Inc., Atlanta, Ga.

Fletcher Equipment Co., Inc., has succeeded The Clyde Equipment Co., Inc., 309 Magazine St., New Orleans, La. Harry W. Fletcher, who was Treasurer and General Manager of the former company, is President of the new organization bearing his name. The Fletcher Equipment Co., will continue to represent the same line of nationally known equipment manufacturers and maintain the same service as heretofore.

Marion Steel Body Co., Marion, Ohio, manufacturers of the Marion line of dump body equipment, has recently acquired control of the R. J. W. Manufacturing Co., of Bucyrus, Ohio, manufacturers of steel mules. The acquired company has been reorganized under the name of Marion Mules, Inc., and has announced a new and improved product to be known as the Marion Mule.

The Gypsum Association, 211 West Wacker Drive, Chicago, Ill., has announced the opening of a New York office at 11 West 42nd St., New York City, with J. Kent Smith as District Engineer.

Hercules Motors Corp., Canton, Ohio, has announced the appointment of four new distributors in Canada and the United States as follows: J. S. Innes, Ltd., of Toronto, will represent Hercules in that city and throughout its natural trading area; the Tractor & Thresher Co., Ltd., of Saskatoon, will distribute Hercules engines and power units in the Canadian Northwest; E. B. Kelley Co., New York City, will represent Hercules in the New York metropolitan area and in Long Island City, Albany, Buffalo, Mt. Vernon, Rockville Center, New York and Newark, New Jersey; and A. H. Krigger & Co., Pittsburgh, Pa., will handle Hercules motors in that territory.

Waukesha Motor Co., Waukesha, Wis., has recently organized a service to owners and manufacturers who use their engines by equipping a section of their new plant with complete manufacturing machinery for the reconditioning of the engines which have been in use and require more than mere adjustment or ordinary minor repairs. Work is handled on a flat rate basis.

Novo Engine Co., Lansing, Mich., has announced the appointment of Ed. B. Goodwin as Eastern District Manager, in charge of the New York Office at 811 Graybar Building, New York City. J. A. Winkler has been appointed as his assistant.

American Manganese Steel Co., Inc., Chicago Heights, Ill., has announced the appointment of the Southern Tractor Supply Co., 406 Greer Building, Durham, N. C., as its exclusive representative for the sale of Amseo manganese steel crawler tractor links and sprockets in the District of Columbia, North and South Carolina, Eastern Tennessee, Virginia and West Virginia.

William Ogden has been appointed Manager of the Manufacturers' Division of the Affiliated Bureau of The Associated General Contractors of America, Inc., and is located at the Munsey Building at Washington, D. C.

Eisemann Magneto Corp., 60 East 42nd Street, New York City, has sent Robert Crockard, its Service Manager, on a six months' trip through Europe, North and South Africa, and Ernest V. Wills, a Service Engineer in the middle western territory, on a 10 months' tour through Australia, New Zealand, India and the Orient. These two pilgrimages are in the interest of improving and expanding the foreign service organization of the Eisemann Magneto Corp.

Progress of the Bureau of Contract Information

TO date performance records and statements of contracts at hand have been received by the Bureau of Contract Information, Inc., Munsey Bldg., Washington, D. C., from 3,367 contracting concerns throughout the United States. Verification information already has been received from public officials, engineers and architects on 30,027 individual construction projects and 42,265 verification replies have also been received from manufacturers and distributors of equipment and materials, financial institutions and surety companies.

The Bureau reports that quite a number of manufacturers have been somewhat impatient because the Bureau has not seen its way clear to announce a definite policy for the disclosure of information to those extending credit to the construction industry. The reason for this is that surety companies who took the initiative in making possible a service to those responsible in the award of public and private construction contracts and the extension of credit to the construction industry did not want the service offered to anyone until the Bureau had passed the experimental stage. S. M. Williams, President of the Bureau of Contract Information, reports that the experimental stage has been passed and the surety companies now realize that the Bureau has demonstrated its ability to gather information regarding the performance record of the contractor which is considerably beyond what the surety companies themselves or any existing agency had heretofore been able to gather.

With this in mind the surety companies, representing 95 per cent of the total contract bonds written in the United States, at a meeting in Washington on May 20, 1930, voted a renewal of their original subscription of \$35,000 toward the further investigation of the contracting concerns throughout the United States.

Distributors' Bulletin Board

New Lines Carried by Construction Equipment Sales Organizations

Additional information in regard to the lines carried by Distributors may be found in the Directory, pages 123 to 150 of this issue of CONTRACTORS AND ENGINEERS MONTHLY.

Bowman-Ralston Tractor & Equipment Co., 401 E. Florida St., Evansville, Ind., has been appointed distributor for the Allsteel Products Mfg. Corp., and Harnischfeger Sales Corp., Milwaukee, Wis.

John C. Louis Co., Inc., 221 S. Eutaw St., Baltimore, Md., has been appointed distributor for the National Brake & Electric Co., Milwaukee, Wis.

Miller-Sanford Tractor Co., Eugene, Klamath Falls and Medford Ore., has added the Willamette-Ersted Co., Portland, Ore., to its accounts.

Willard Equipment, Ltd., Vancouver, B. C., Canada, has added the gasoline saws, pumps and engines manufactured by the Witte Engine Works, Kansas City, Mo., to its line of contractors' equipment.

Buell Equipment Co., 318 North Clinton St., Syracuse, N. Y., successor to Clarence H. Buell, has added the following accounts: Butler Bin Co., Waukesha, Wis.; Leach Co., Oshkosh, Wis.; Red Star Products Corp., Cleveland, Ohio, and MacWhyte Co., Kerosha, Wis.

Drake Tractor & Equipment Co., 116 S. Washington St., Rome, N. Y., has added the following to its line of contractors' equipment: Atlas rotary scrapers, made by the Atlas Scraper Co., Bell, Calif.; tillage equipment, manufactured by the Killifer Mfg. Co., Los Angeles, Calif.; and Davey air-cooled compressors, a product of the Davey Compressor Co., Kent, Ohio.

United Hoisting Co., 165 Locust Avenue, New York City, is now representing the Barnes Mfg. Co., in New York City territory.

F. W. Gartner Co., 1010 Milby Street, Houston, Texas, has added Bay City winches made by the Bay City Foundry & Machine Company to its account.

Western Material Company, Sioux Falls, South Dakota, is handling Bay City truck cranes as part of its complete line of construction equipment, tractor supplies and road machinery.

Contractors Sales Company, Inc., 75 State Street, Albany, N. Y., has recently added Allis-Chalmers Monarch tractors to the equipment that it is handling for general contractors and road builders.

C. T. Patterson Company, Inc., 800 Tchoupitoulas St., New Orleans, La., has added Johns-Manville brake lining in order to be better able to serve contractors.

Service Supply Corp., 20th and Venango Sts., Philadelphia, Penna., has recently added R. B. Carter Co., Hackensack, N. J., to its accounts.

General Construction Material Co., Ltd., 834 St. James St., W. Montreal, P. Q., is representing the following manufacturers: Willett Mfg. Co., Bay City Shovels, Inc., Alan Wood Steel Co., Warner Quinlan Co., Solvay Sales Corp., Coleman Motors Corp., Diamond Iron Works, Inc., Dyer Welding Machine Corp., Freeman Mfg. Co., Galion Iron Works & Mfg. Co., Shunk Mfg. Co., Sterling Machine-Maine Steel Products Co., Aeroil Burner Co., Inc., and New England Road Machinery Co.

Waterhouse Equipment Co., Inc., Jackson, Mississippi, has changed its name to **Jackson Equipment and Service Co.**, and is handling the following lines: Allis-Chalmers tractors, Ryan graders, Sidney wheelers, slips and plows, du Pont explosives, Leschen-Hercules wire rope, Wyoming shovels, Athey truss wheel wagons, Trackson crawlers, Alomite lubricants, Huber road rollers, Kalman reinforcing steel and P & H draglines and shovels.

The Brown-Bevis Company, 49th Street and Santa Fe Ave., Los Angeles, Calif., has added Wonder and Marsh-Capron concrete mixers made by the Construction Machinery Company to its lines.

The Pope Equipment Co., 4111 Euclid Ave., Cleveland, Ohio, is now representing Good Roads Machinery Co., in the Cleveland territory.

J. Shuman Hower, 106 Foster Building, Utica, N. Y., is now representing the Ransome Concrete Machinery Co., in the sale of its pavers, mixers, towers, chutes, and carts.

John Fabick Tractor Co., 2812-16 Iowa Ave., St. Louis, Mo., has recently added the American Tractor Equipment Co., Oakland, Calif., to the list of concerns this company represents.

Cardose & Lindo, P. O. Box 112, Panama, R. P., has recently taken on the account of La Plant-Chonte Co., Leschen wire rope, Marlow mud hog pumps, J. A. Fay & Egan Co., and Reo Motor Car Co.

Fickeissen-Finney Equipment Co., 4930-32 Southwest Avenue, Saint Louis, Mo., is now handling Rome graders, made by the Rome Manufacturing Co., Rome, N. Y.

Garfield & Co., Hearst Building, San Francisco, Calif., has been appointed distributor for Erie buckets and Aggre-Meters made by the Erie Steel Construction Co.

The Boardman Company, Oklahoma City, Okla., has been made distributor for Allis-Chalmers Mfg. Co., on Monarch and United tractors with allied equipment, Euclid Crane & Hoist Co., and Armeo Culvert Mfrs. Assn.

Clark-Wilcox Company, 790-798 Albany Street, Boston, Mass., has recently taken on the sales of Trucktor crawler trucks in its territory.

E. A. Martin Machinery Co., 501-523 School St., Joplin, Mo., and Springfield, Mo., has recently been made distributor for Schramm, Inc., and Hyster truck cranes.

Boehck Machinery Co., Inc., 2404-06 Clybourn Street, Milwaukee, Wis., has recently taken on the Bay City truck cranes account in addition to its well rounded line of construction equipment.

Superior Supply Company, 1850 South Kostner Avenue, Chicago, Ill., has been appointed exclusive distributor for the Clyde Iron Works line of hoists and the Chain Belt Co.'s complete line of gasoline pumps.

Fletcher Equipment Co., Inc., 309 Magazine St., New Orleans, La., has added Bay City truck cranes to its well rounded line of construction equipment.

The Tractor & Thresher Co., Ltd., 38 Twenty-Third St., Saskatoon, Saskatchewan, Canada, has added the La Plant-Choate line to its accounts.

J. W. Bartholow Co., 1221 South Lamar Street, Dallas, Texas, has recently become distributor for Bay City truck cranes in its territory.

H. Kleinbans Co., Union Trust Bldg., Pittsburgh, Penna., has recently added to its line of equipment the gasoline and diesel-electric locomotives, made by the Mid-West Locomotive Works and the truck cranes manufactured by the Bay City Foundry & Machine Co.

Johnson & Dealaman, Inc., 60 Marshall St., Newark, N. J., are now distributors for Bay City truck cranes.

An Earth Borer for Horizontal Holes

AN earth boring machine which will bore holes under railroads, paved highways and streets, making it easy to install pipes, without the necessity of trenchers which tie up traffic, has been announced by the Young Engine Corp., Canton, Ohio. One of these Young road crossing boring machines made possible the installation of 50 feet of 18-inch pipe under a railroad track in Canton, Ohio, in just four hours.

This boring machine is a horizontal rotary drill using the pipe or casing that is to be installed, and which remains in the ground when the job is completed, as the medium for carrying the rotating cutter head. In operation the boring machine is placed in the ditch and the power unit is set up on the bank at the side. Power is transmitted by means of an adjustable drive shaft with universal joints to the upper sprocket of a chain and sprocket drive on the boring machine which can be set at the desired height. This system of power transmission is flexible and adjustable to all operating conditions.

The pipe or casing to be installed is bolted to the rotating hollow driving sleeve by means of 8 x 13½-inch forged steel pipe flanges. A suitable cutter head is attached, usually welded, on the forward end of the casing.

The rotating hollow sleeve is forced forwards by jacks and the rotating power is applied to it by means of a worm gear reduction. The combined rotating and forward motion of this sleeve forces the pipe into the embankment. Dirt is removed through the hollow sleeve by means of a spoon attached to a long pipe handle, or by water where conditions are favorable.

After the casing has entered the embankment, a distance of about 6 feet, or, in other words when the rotating hollow sleeve has advanced forward to its full extent, the flange of the driving head is unbolted from the pipe or casing and a 5½-foot flanged extension joint is inserted between the rear end of the pipe and the flange of the sleeve which has been backed to the starting position. This cycle of operation is continued, additional extension 8-inch by 5-foot 6-inch joints being inserted at each full forward movement of the rotating hollow sleeve until the entire pipe or casing has been installed.

When possible and desirable, the entire length of pipe to be installed is welded or screwed into one piece and the boring machine is placed in the ditch at a distance from the embankment equal to the length of the pipe. The lay of the land sometimes makes this impossible or impractical, in which case the pipe to be installed is made up in lengths as long as can be handled conveniently.

The type of cutter head used depends upon the nature of the ground to be passed through and the size of the casing. For smaller pipes a solid cutter head may be used, forcing the dirt back into the sides of the embankment. With larger casings a hollow cutter head is used, the broken-up dirt being removed by passing back through the casing and out through the hollow rotating sleeve of the machine.

In long installations, where a great number of 5½-foot extension joints would be required, 20-foot joints are substituted for the shorter extensions after the work has progressed to a point where this is desirable.

The 20-30 horsepower power unit required to drive the boring machine has 3 speeds forward and reverse and is furnished complete with a weatherproof hood and an adjustable drive shaft with a universal joint.

Equipment of this type may be used to place a pipe of large diameter in making the initial bore. Then pipes of smaller diameter for steam, or cables may be run through.

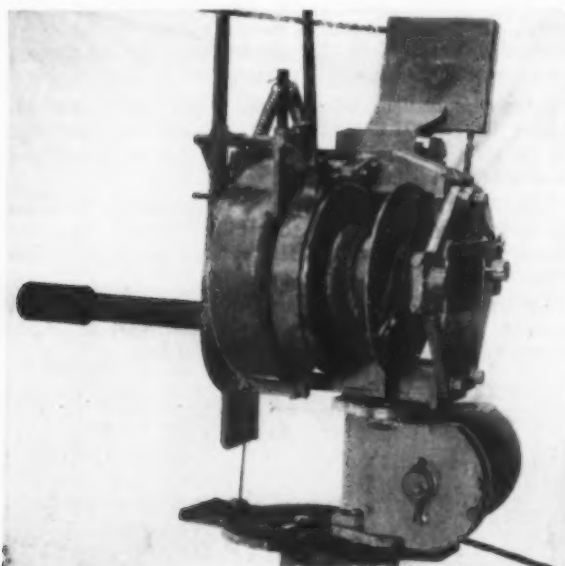


Installing an 18-Inch Pipe Under a Railroad Track with the Young Boring Machine

A New Tractor Power Take-off

A NEW double cable winch power take-off for Caterpillar tractors has been designed and is being built by R. G. LeTourneau, Inc., 122 Moss Avenue, Stockton, Calif. The inspection plate on the rear end of the tractor is removed and replaced by the winch, which is compactly built. There are two 6-inch drums on which cables can be wound or unwound by the driver of the tractor while the latter is traveling or standing still. This winch has a line pull of 2,000 pounds and a line speed of 200 feet per minute. It is made entirely of steel plates and bars electrically welded and runs on Timkin bearings.

This power take-off is being used to operate Le Tourneau 12-yard dump carts, 7-yard scrapers, bulldozers and hardpan rooters. It also can be used with a derrick for handling heavy material such as concrete pipes, or in many other ways by contractors in construction work.



The New Le Tourneau Power Take-Off Cable-Controlled Winch

An Electric Pier-Hole Pump

A SMALL centrifugal pump with a 2½-inch suction and 2½-inch discharge is designed especially for unwatering deep holes, caissons where space is restricted and where men must work close to the pump, has just been announced by the Domestic Engine & Pump Co., Shippensburg, Pa. The pump is said to be just as good for any kind of pumping whether deep or shallow within its range of capacity and pressure, where suitable electric current is available. The pump is always primed when the lower end of the pump is in water.

It has a trash type impeller designed to handle the usual dirty or sandy water commonly found in construction ditches, pier holes and caissons. The parts exposed to wear when handling water containing abrasive materials are made to be easily and cheaply replaced. The pump is made to run in any position, vertically or on an angle, as long as the motor is kept out of water.

The pump is 6 feet long, its largest diameter is 11 inches and its weight 260 pounds. The motor is a 5-horsepower unit and operates on 220 volts, 3 phase, 60 cycles. It is fitted with 75 feet of heavy waterproof 3-wire service cable with plug and receptacle.

Using 2½-inch non-collapsible discharge hose the same length as the depth of the hole, the following capacities can be obtained: 250 gallons per minute from a hole 10 feet deep, 200 gallons per minute from a hole 25 feet deep, 150 gallons per minute from a hole 40 feet deep, 100 gallons per minute from a hole 50 feet deep. For holes deeper than 50 feet the manufacturers recommend the use of two or more pumps placing one at the bottom and then running the discharge from the lower pump into the suction of another placed 40 to 50 feet higher using as many individual pumps as may be required for the depth of the hole.

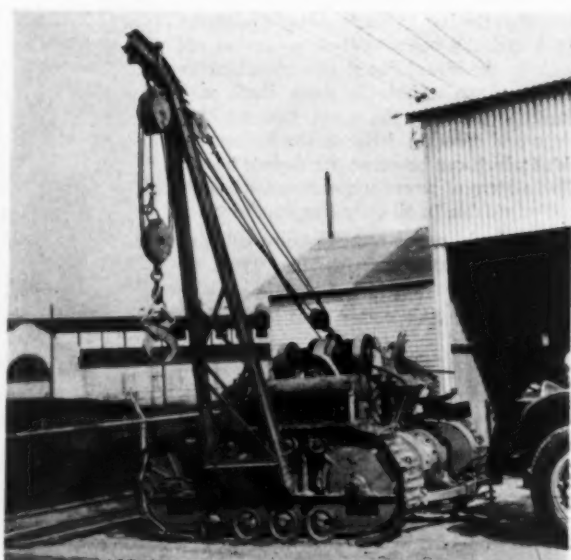


A New Pier-Hole Pump

A Pipe Laying Boom for Light Weight Tractors

THE pipe laying boom shown in the accompanying illustration has attracted considerable attention among pipe line operators and contractors. It consists of a Fordson tractor equipped with Trackson crawlers and the Berg boom which is manufactured by the Resistcor Engineering Corp., Tulsa, Okla.

The Berg boom, developed by Matt Berg of the Cushing Motor Co., Cushing, Okla., is a live boom job moving up and down to pick up or lower the pipe. It is mounted directly to the crawler frame and the hoisting drums are so mounted that they help to counterbalance the weight of the boom. The lever controls of the hoisting mechanism are close to the driver's right hand and there is no obstructing framework to interfere with his vision.



A Berg Pipe Handling Boom, Mounted on a Model D Trackson Fordson Crawler Tractor

New Three-Wheel Industrial Tractor

A NEW tractor with a speed of 20 miles per hour built with three wheels using the Ford Model-A industrial motor has been announced by the Sterling Tractor Equipment Co., 62 Bush Street, Brooklyn, New York. The tractor is steered by an arm instead of a wheel, the reason for this being that by this method the operator always knows where the front wheel is pointing. All the wearing parts, except the chain drive, are standard Ford parts. It has a 3-speed transmission, worm drive truck rear end, battery and starter.

The length of the tractor is 76 inches, width 44 inches, height 50 inches, and wheel base 44 inches. It will turn at a radius of 56 inches, has a gas tank capacity of 6 gallons, a self-starter, cushion seat and weighs 2,800 pounds. The front wheel, which is spring-mounted, carries a 17 x 5-inch Firestone tire and the rear wheels carry 24 x 5-inch Firestone tires with 3 inches of rubber. The front bumper is made of $\frac{3}{4}$ -inch plate and the rear bumpers of $\frac{5}{8}$ -inch plate.



The Sterling-Tiger Tractor

A New Clutch for Industrial Engines

THE latest addition to the heavy duty industrial clutch field is a balanced expanding shoe clutch manufactured by the Fawick Manufacturing Co., Waukesha, Wis. This type of clutch has many uses in power-driven machinery in the road building and construction field. It is stated that besides its compactness, light weight and easy adjustment, the clutch employs large surface contacts which result in low pressure and long life for every part. The expanding shoes are connected to a system of counter-weights which are applied through a 3:1 leverage to the toe of the shoe and automatically maintain their effect regardless of wear, making the effort of engagement and disengagement the same under all conditions of load and service.

Lightness of rotating parts is secured by the liberal use of steel stampings, hollow steel pivot pins and steel forgings. The pivot pin and shoe bearings are very large and because of the very small travel and low unit pressure, it is said that wear with its accompanying chatter and noise is practically eliminated. The moulded asbestos clutch facings, similar to those used for heavy truck and bus brakes, are reported to have shown a possible life equivalent to two million clutch engagements. This is attributed to the large capacity for dissipating heat inherent in this type of clutch, coupled with its light loading pressures.

The adjustment of the clutch is simple and requires no tools.



The New Fawick Clutch

It is accomplished by a small worm meshing with a gear, shown directly back of the operating yoke, which engages three eccentric studs carrying the inner ends of the shoe toggles. Movement of the adjusting worm causes each of the three eccentric studs to rotate simultaneously and exactly the same amount. This rotation moves the toggles out or in as required. Notches cut on the outside of the worm engaging a detent spring prevent accidental changes of adjustment. Moving the adjusting worm one notch, moves the shoe approximately one-thousandth of an inch. It is said that it is impossible for one shoe to become tighter than the other or to get the clutch out of balance because all adjusting parts are moved simultaneously.



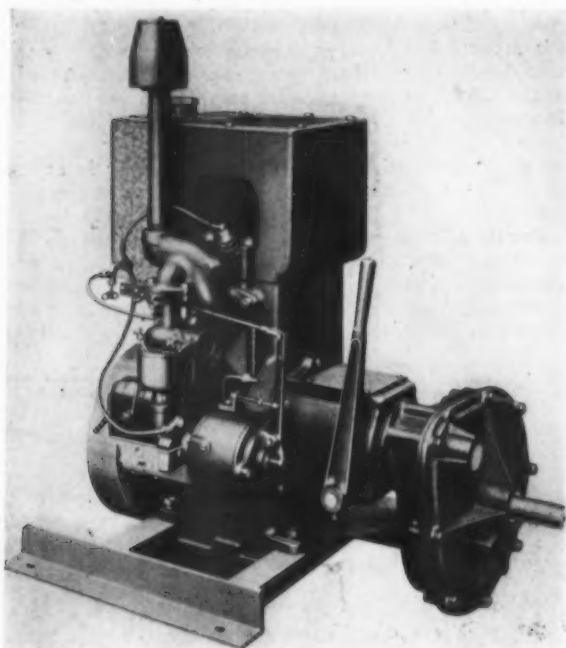
EXCAVATING FOR THE DETROIT-WINDSOR TUNNEL

McCormick-Deering industrial tractors equipped with Bay City shovels worked day and night to facilitate the rush schedule for the excavation of the Detroit approach to the tunnel. The tractor in this illustration operated in very close quarters and in very sticky blue clay 95 feet below street level. The shovel is delivering the dirt into a Six-Speed Special International Harvester truck equipped with a 1½-yard gravity dump body. Mark R. Hanna Co. was the contractor for this project.

Refinement in Single and Double Cylinder Industrial Engines

THE complete line of 1½ to 16-horsepower Stover industrial engines made by the Stover Manufacturing & Engine Co., Freeport, Ill., may be had in either horizontal or vertical types, either hopper or radiator-cooled and with or without a metallic housing. These engines are stated by the manufacturer to be particularly adapted for driving cement mixers, paint spray outfits, orchard sprayers, hoists, diaphragm pumps, centrifugal pumps, irrigation pumps, or for other industrial service where light weight and dependability are required.

The Stover horizontal engine is an industrial job, with crank case and governor parts completely enclosed, and the entire unit lubricated from oil carried in the crank case. Stover 1, 2 and 4-cylinder vertical engines use the same piston, connect-



A View of a Stover Industrial Engine Showing a 4 to 1 Power Take-Off Reduction with Friction Clutch

ing and pin bearings and many other parts, simplifying the question of repairs and service. The horizontal engines are fitted with Wico type EK magnetos, while the vertical line carries a universal plate, making it possible to use any standard make of ignition.

Practically all sizes of Stover engines are furnished with either a straight crankshaft drive or a drive from the camshaft at one-half engine speed or, if desired, they can be furnished with various gear reductions, and power take-offs to meet almost any conditions. When the speed reduction is greater than 2 to 1, the reduction gear case can be swung in any position around the crankshaft.

The question of the use of diesel power is an important problem to the contractor. In an unusually interesting article scheduled for the January issue, R. E. Swinney, Swinney & Coleman, Port Allen, La., describes his company's experience with diesel power for draglines.

Equipment for Controlling Ammonia in Water Purification

THE increasing use of the chlorine-ammonia process for the prevention of phenol and certain organic tastes and odors in water supplies is being given extensive investigation today. Recognizing the need for accurate and dependable control of apparatus, Wallace & Tiernan, Inc., Newark, N. J., have developed MDPA and MDWA ammoniators.

This apparatus follows very closely the design of W & I direct feed chlorinators, though certain modifications and changes have been necessary to adapt this apparatus to the feeding of ammonia gas. The MDPA ammoniator is a self-contained unit and can be installed anywhere. The MDWA ammoniator is made in two forms, one for mounting on the wall at a place convenient to the point of application, and the other is adaptable for mounting on the standard W & T type MDP or MSP chlorinators. The apparatus is rugged, well constructed and attractively finished and is guaranteed to an accuracy of 4 per cent.



W & T Ammoniator

A New and Safer Scarifier

THE Trojan Grade-Ripper, made by the Contractors Machinery Corp., Batavia, N. Y., has eliminated the operating lever as a first safety step. The manufacturers feel that the new tractor-drawn Grade-Ripper is a decided advancement over those formerly built. The control levers have been eliminated altogether and a rugged worm gear and wheel take their place. This aims to make the machine easy for one man to operate, but permits the scarifying depth to be controlled while the machine is in motion. Therefore, a definite depth may be maintained without stopping the tractor to permit such adjustment as was necessary with the old type of tool controlled with two levers.

The new machine is equipped with a universal hitch, or draw-bar attachment, which permits the Grade-Ripper to be operated either directly from the tractor or by a chain hitch. The new method of tool attachment holds the teeth in a definite and pre-arranged position but defines the angle of the entrance of the tooth into the surface.



The Trojan Grade-Ripper

The Grade-Ripper is provided with special shaped teeth suitable for the conditions under which it is to be used. There are certain types of work where the straight-pointed teeth are satisfactory, and others where the flared or snakehead teeth are much more effective. All type of teeth are made from high-carbon open-hearth steel, heat treated to withstand wear.

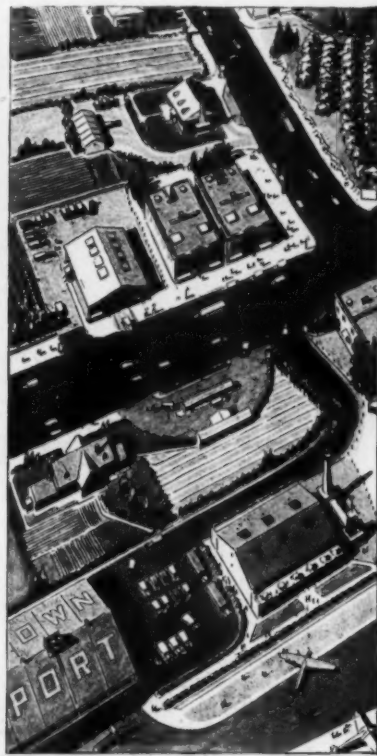
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LORAIN-55 BOB-TAIL SHOVEL

A Lorain-55 equipped with a 12-foot boom, 10-foot stick and special 1¼-yard rock dipper used by Haley, Chisholm & Morris, Charlottesville, Va., on the approaches to the Big Ben Tunnel at Talcott, W. Va., for the C. & O. R. R.

Bob-Tail Electric Shovels

A LINE of bob-tail electric shovels that are particularly adapted for underground mining, tunnel and subway construction, or any job that necessitates the operating of a machine in close quarters, has been announced by the Thew Shovel Co., Lorain, Ohio. The units offered are the Lorain-75-B, Lorain-55 and Lorain-45, their standard 1¼-yard, 1-yard, and ¾-yard machines, modified in a few respects to meet unusual working conditions found in this field.

The basic center-drive principle in turntable, crawler and shovel boom is preserved on all units. Extremely short tail swing clearances are obtained by a unique method of construction. The electric motor, which on the standard units is located at the rear of the turntable mechanism, is placed at the front of the platform. It is mounted on a special heavy-duty A-frame strut casting at the right side of the turntable. The silent chain power take-off is merely reversed and the same direct application of power to the hoist crowd and travel shafts through the center drive pinion is obtained. Standard full-size motors are installed, the Lorain-75 is equipped with a 60-horsepower unit, the Lorain-55 with a 50-horsepower unit, and the Lorain-45 with a 30-horsepower unit. The locating of the power plant in the front makes possible the reduction of the Lorain-75's tail swing clearance from 10 feet to 6 feet 6 inches, and that of the Lorain-55 and Lorain-45 from 9 feet to 5 feet 10½ inches.

Bob-tail units equipped with a 12-foot boom and 10-foot stick are capable of working in an opening 20 feet wide and 15 feet high with the boom at a 45-degree angle. Proper stability is secured by means of building a special counterweight into the rear so that it extends up to the back of the cab about 18 inches. Any of the bob-tail units are readily convertible to standard machines with long range shovel, clamshell or dragline booms powered by gas or electric motor.

Shovel booms 12, 14 and 16 feet long may be obtained. In construction they are of all steel, box section, plate girder type. The shipper shaft is of the standard center drive design. It derives its power from a special heat treated crowd chain driven in a positive manner from the front shaft through the boom hinge pin, so that it is self-adjusting to all boom angles. An automatic crowd brake holds the dipper stick

against reversal without the attention of the operator. Dipper sticks, 8, 10, 12 and 14 feet, are furnished according to boom length. They are all steel, welded, one-piece rectangular sections with a patented greenhorn at one end.

A special rock dipper, shallow and extra wide, affording generous clearances for large slab rock, or one of standard design of 1¼, 1 and ¾-yard capacities can be furnished as is desired.

Mounting for all machines is the Thew center-drive crawler. These are standard crawlers not modified in any respect. All of the propelling gears and steering clutches are enclosed in a heavy steel crankcase, which is placed up high so as to afford ample ground clearance.

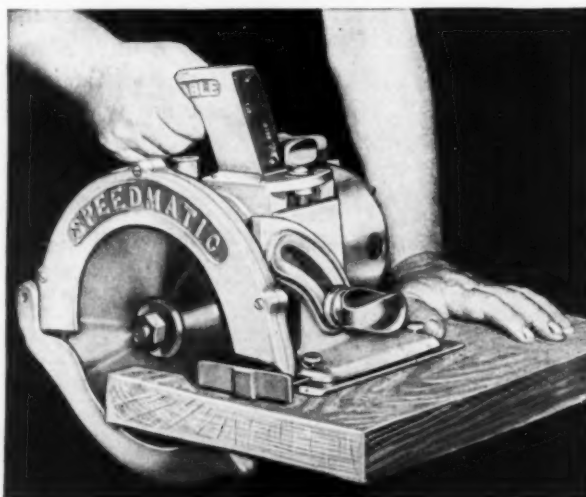
Current is brought in through the crawler truck to collector rings. Sliding contacts on the bottom of the turntable transmit the current to the motor. The control of the motor is effected through the simple means of an automatic push button starter and control. General Electric motors and Cutler hammer controls are used unless otherwise specified.

A New Hand Power Saw

A GEAR-driven hand power saw, known as the Speedmatic saw Type K-9, has been recently placed on the market by the Porter-Cable-Hutchinson Corp., Syracuse, N. Y. The motor is a 1¼-horsepower and is geared to the drive arbor through hardened spiral gears having a reduction ratio of 2 1/7 to 1. This drives the 9-inch saw blade at an unusually high speed for this type of saw, running at 5,000 rpm free speed and about 4,000 rpm under the average cutting load. At this high speed it is possible to rip a 3-inch plank 12 feet long in 1 minute, cross cut 3 x 6 material in 2 seconds and cross cut 2 x 12 material in 4 seconds.

This saw will cut a maximum of 3½ inches. Both depth and angle adjustments are easily made by turning a thumbscrew. The former has a 1¾-inch travel and any angle up to 45 degrees can be secured, the scale being graduated in 5 degrees. Dadoes 6 inches in diameter, ½-inch maximum width can be used, and this dado will cut to a maximum depth of 1¾ inches.

The motor is cooled by a large turbine fan which draws the air in through the commutator and expels it through the saw housing and also a special opening to blow the dust away from the cutting line. Four S.K.F. precision ball bearings are used, eliminating wear at vital parts. A swing guard completely covers the blade at any angle, opening easily when cutting and snapping immediately into place when finished. The saw weighs 23 pounds and is furnished with a rip guide, combination wrench and screw driver, 15 feet of rubber cord, a switch in handle, a combination blade and a carrying case.



A Speedmatic Hand Power Saw

5 of a Great Fleet of "AIR KINGS" for One Utility Company

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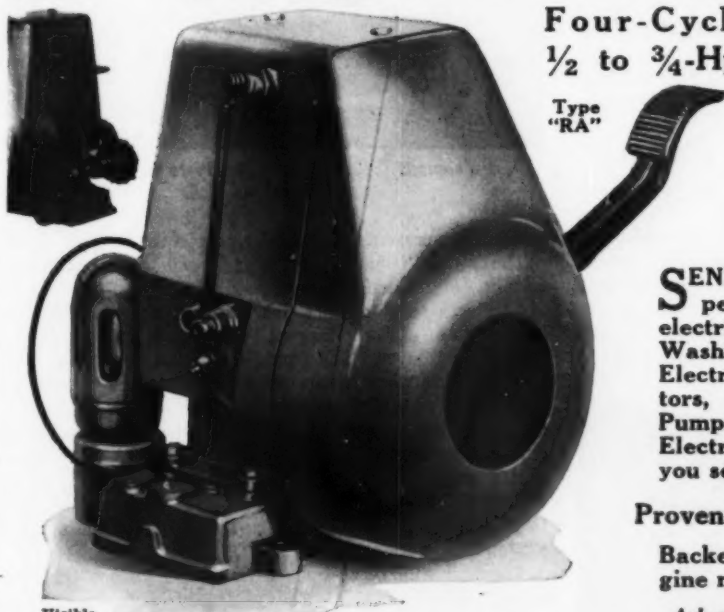
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Wood Type C-1 All-Purpose Dump Body

A New Line of Dump Bodies for Light Chassis

A COMPLETE new line of dumping units for light chassis has been announced by the Wood Hydraulic Hoist & Body Company, Detroit, Michigan. From this line users of light dump trucks can select a hoist and dump body suited to practically every need. Four hoist models are offered, built on the hydraulic principle developed 10 years ago by the Wood organization. The bodies, known as the C-type, are constructed of a 10-gage resistance steel, electrically welded. The sides are flanged to prevent bulging or bending. The tailgate is strongly reinforced, swinging either up or down, and is adjustable and lowers flush with the body floor. The tailgate presses against the end of the body sheet making a tight fitting joint when closed. The tailgate posts are rigidly built from one-piece pressed steel turned in and welded to the body sides as a brace.

The body subframe is built of two 4-inch channel longitudinals and five 3-inch channel cross members. Low mounting is one of the important new features of these bodies. Several types have full length running boards covering the rear dual wheels. The complete line includes contractors' bodies, garbage bodies, concrete mix and gravity bodies.

The Wood type C-12 body is designed for heavy duty service. It has full length running boards and steel side braces to stiffen the sides. This body with the Wood Model G-1 hydraulic hoist is adapted for handling heavy material.

The Wood type C-4 for contractors' bodies is well designed and strongly built for hauling sand, gravel, and general material.

A Variable-Height Crane

A MOBILE variable-height crane which has a capacity to lift 2 tons to a height of 13 feet, and yet when the boom is horizontal, the entire equipment has an overall height of but 7 feet 10 inches, has been announced by the Clark Tractor Co., Battle Creek, Mich. This Clarktor crane is said to have shown considerable economy in the handling of heavy material and machines in storage and can negotiate narrow openings on construction jobs with ease.



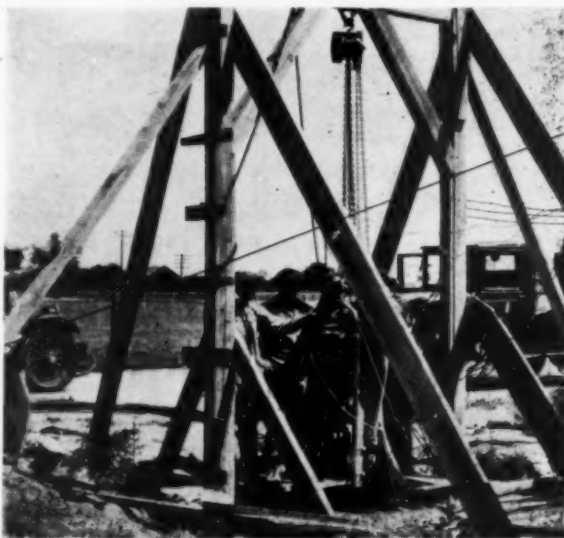
The New Clarktor Boom Crane

The chassis is the rugged Clarktor tractor which has the shortest turning radius of any comparable industrial tractor, namely, 108 inches. It has standard truck transmission, the Clark truck axle and a multiple disc clutch. Its equipment includes a self-starter, generator, battery and head and tail lights. The tractor type gas engine uses 5 or 6 gallons of gas and a pint of oil daily, making operating costs low. Since it uses gas power, the job is capable of 24-hour operation.

Electric Caisson Pumps

A SIMPLE sturdily-built electrically driven pump which will handle water at high heads from deep caissons and will handle dirty water containing sand, silt or mineral or acid solutions has been announced by Yeomans Brothers Co., 1433 Dayton Street, Chicago, Ill. The pump frame is built with an eye bolt so that it can be lowered into the caisson by a cable or derrick as construction progresses. The unit is compact in design, light in weight, and is built in three sizes to handle various capacities at different heads.

A grease lubricated babbitt bearing is mounted on the pump casing, and a grease lubricated ball thrust bearing is mounted on the yoke attached to the upper side of the casing. This



A Yeomans Caisson Pump Ready to be Lowered by a Chain and Falls

construction prevents any misalignment in the bearings or shaft.

The motor mounting is so arranged that either direct current or alternating current motors may be used and interchanged on the job without delay. The motor is protected against dripping water and falling rocks by an enclosing cover. The pump is designed for quick replacement of parts when repairs are necessary. The caisson pump is made of carefully selected durable materials consisting of a forged steel yoke with lifting ring and two 10½-pound side channels between which the motor and pump are well supported and securely anchored. The pump is made of close grained cast-iron direct-connected to the vertical motor through a flexible coupling. The impeller is of the open type mounted on a stainless steel shaft.

The unit is built to deliver 75 to 175 gallons per minute against a head of 40 to 60 feet, is equipped with a 5-horsepower motor and weighs 625 pounds. The next unit, of the same capacity, but which operates against a head of 60 to 80 feet, is equipped with a 7½-horsepower motor and weighs 725 pounds. The third unit, capable of delivering from 50 to 200 gallons per minute, against a head of 80 to 110 feet, is equipped with a 10-horsepower motor and weighs 750 pounds.

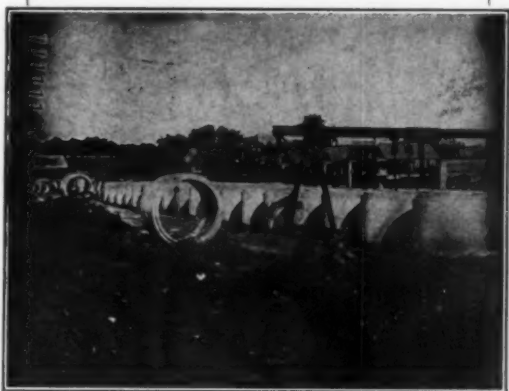
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Steel Dragline Blocks Now Available in Sizes Up to 42 Inches



New 6-Inch Sauerman Durolite Block with Swivel Hook Attachment

A RECENT development in Durolite steel dragline blocks made by Sauerman Brothers, Inc., 464 South Clinton St., Chicago, Ill., is that while these blocks have in the past been made in only 12 to 30-inch diameter sizes, they are now available in a wide range of sizes from 6 to 42 inches. The development of larger earth moving power scraper machines caused the addition of the blocks from 36 to 42 inches in diameter and at the other end of the line the small Durolite blocks with 10, 8 and 6-inch sheaves were necessary where absolute minimum weight for excavating is the prime requirement.

These blocks are built of light and tough special heat-treated alloy steels combining great strength with light weight. The flange of the sheave is protected by a heavy bead on the housing, eliminating fouling and protecting the cable. The block can be opened up to receive or to remove the cable by simply removing one pin from the yoke. It can be completely taken apart with a small wrench and can be kept in repair indefinitely. Lubrication is provided through the sheave and not through a center-bored axle, and a grease reservoir is provided around the bearing, giving an adequate supply.

The blocks are furnished with either bronze-bushed or roller bearings and with swivel hook, swivel rope bearing eyes or swivel pin-bearing eye attachments.



Block Is Opened to Receive Cable by Removing Only One Pin. Durolites of 10-Inch and Larger Are Made This Way

Four-Wheel Drive for Tractors

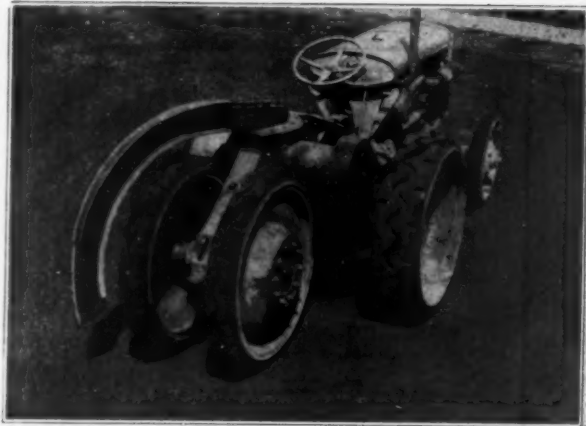
A UNIT which distributes the engine power of a wheel-driven industrial tractor to four wheels, thus improving the traction and reducing the operating expense through greater time mileage and increased economy in fuel and time, has been developed by the Rightway Corp., 228 North La Salle Street, Chicago, Ill.

All wheel tractors are driven through a conventional differential. Whenever the traction of one of the drive wheels falls below its share of the load, slippage occurs, wasting power, reducing speed and damaging tires.

The auxiliary drive wheels of the Rightway are positioned inside and to the rear of the tractor wheels, providing traction at four points across the traveled surface. This location of the wheels resists side draft tendencies and reduces side skidding. As each wheel carries its share of the weight, therefore, there is only half the tendency for them to sink down in the soft spots and the load carried on the axles may be greatly increased.

The Rightway multi-wheel drive unit consists of a divided jackshaft with a standard differential mounted between its two elements. In the same housing, and to the rear of the jackshaft, is a solid axle carrying the auxiliary traction wheels. These wheels are driven by a single chain from a sprocket mounted upon the cage of the jackshaft differential. Although two wheels are mounted on this solid axle, the drive is, in reality, a three-point drive.

The unit is pivotally attached to the tractor and is driven



The New Rightway Auxiliary Power Axle for Industrial Tractors

by chains from sprockets on the inner side of the tractor wheels, to sprockets on the jackshaft. Thus the differential action between the ends of the main tractor axle and the jackshaft is complete, but the action in the auxiliary differential is accomplished in a reverse manner. Thus, while the power is transmitted to the tractor wheels through a differential in the conventional way, the power to the solid axle is transmitted from the auxiliary differential cage.

The tractor differential is positively driven by the engine and compensates for any difference in the speed of the two tractor wheels. Thus, the average speed of the tractor wheels is always the geared engine speed. By the operation of the second differential the auxiliary wheels are, at all times, positively driven at the average of the two tractor wheels or geared engine speed. The auxiliary wheels are positioned midway between the two main wheels so that their speed is correct for any turning radius.

The drawbar is hitched above the plane of the axle and provision is made for attaching the push frames of motor graders, snowplows, etc., at a point high on the bracket connecting the drive unit to the tractor axle. Inasmuch as the drive unit pivot around the tractor axle, any thrust or pull rearward above the plane of the axles results in a down thrust on the positively driven auxiliary traction wheels. The live load is used for ballast. As the load or resistance is increased, this down thrust increases in direct proportion, affording more positive traction as it is needed and in proportion to the need.

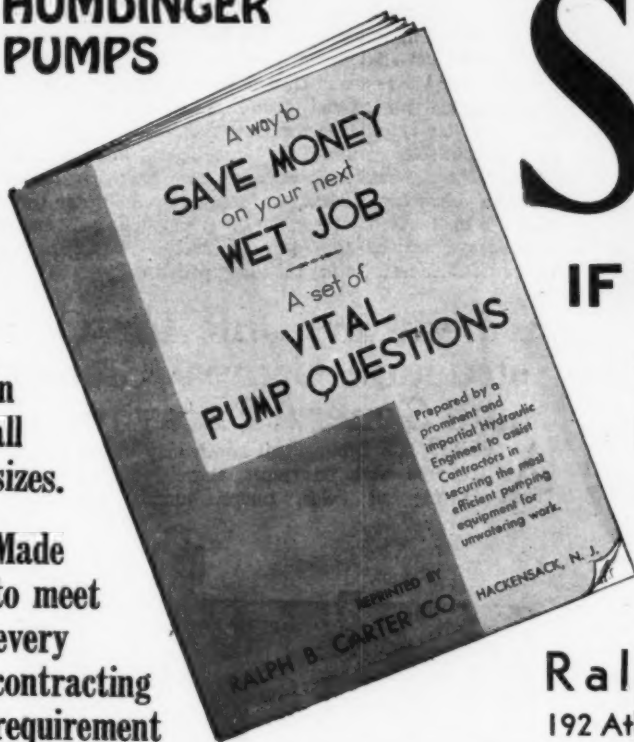


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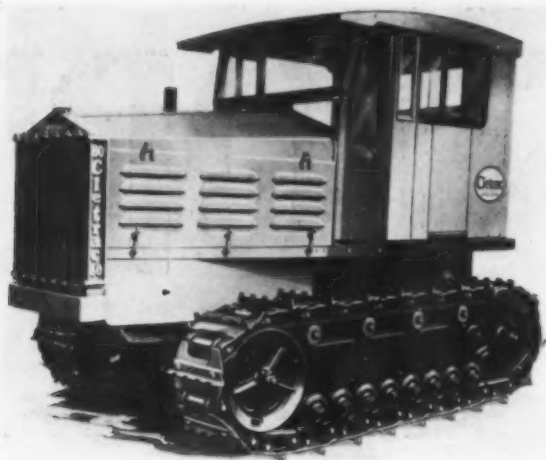
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A Cletrac 80-60 Equipped for Winter Service

Tractors Made Ready for Cold Weather Service

POWERFUL tractors are as important features in construction work in winter as in summer, but the operators must be properly protected to permit them to guide these machines efficiently and also adequate light must be provided for the many dark hours in the working day.

The Cleveland Tractor Co., 19321 Euclid Ave., Cleveland, Ohio, has equipped the 80-60 Cletrac for winter use with an enclosed cab and ice grouters on the tracks. This machine is also equipped with an electric starter which eliminates hand cranking and makes it possible for the driver to operate the tractor with the greatest ease and comfort. It is unnecessary for him to leave his protected position in the cab at any time.

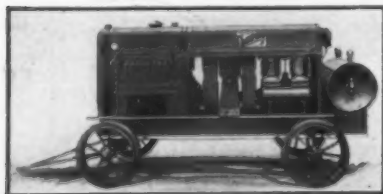
Headlights may be also quickly installed and connected to the electrical generating unit for night use of the machine when required.

A Trailer-Mounted Air-Cooled Air Compressor

THE advantages claimed for "air-cooled air" in the Davey compressor, made by the Davey Compressor Co., Kent, Ohio, are of interest. Air-cooled air prevents the freezing and cracking of castings in cold weather, provides an efficient method of cooling the discharge valves and heads and minimizes the care necessary to maintain the equipment in operating condition. It also permits of lightness and simplicity and compactness of construction.

The Davey trailer-mounted portable air compressor has a light weight compressor and engine. Power from the engine, which is run at moderate speed, is transmitted through multiple Dayton V-belts and reduced to a favorable compressor speed. The clutch insures easy starting by permitting the engine to be started alone, the compressor being thrown in after the engine

is running. The air capacity of 142 cubic feet per minute is sufficient to operate one large or two small rotating jack hammers, or two cement breakers, or four tie tampers, or other tools



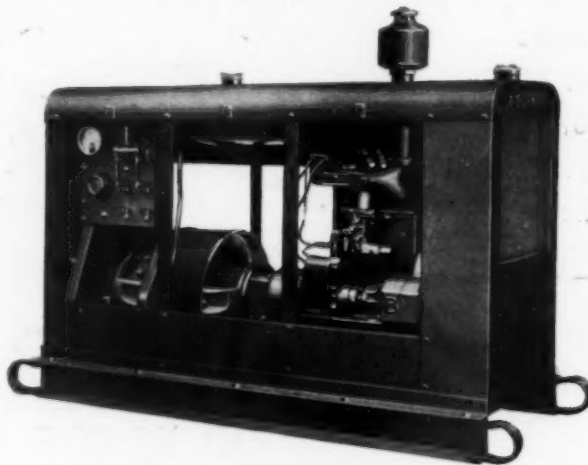
A Davey Portable Air Compressor

of similar heavy requirements.

The air compressor is of the 2-cylinder vertical type, air-cooled, has a removable side plate for the inspection of connecting rod bearings and other working parts. The cylinders are of semi-steel, accurately bored, ground to a high finish to insure maximum efficiency and long life of cylinder rings and pistons. The valves are of chrome vanadium steel of the plate disc type, heat treated and ground. The valve springs are of the flat volute type. The pistons are of the best grade iron, light in construction, ribbed for strength, and fitted with four piston rings for maximum compression. Reduced clearance and high volumetric efficiency are secured by the piston traveling close to the head. The unloader is simple in construction, positive in operation, and functions through holding the inlet valves off their seats during the idling period.

A Lighting Unit for Construction Camps, Cranes and General Excavation

A PORTABLE lighting unit which may be used in construction work on cranes, shovels, bridges, dredges, in the oil fields, camps, tunnels and excava-



The Novo Portable Lighting Plant

tions has been developed by the Novo Engine Co., 216 Porter St., Lansing, Mich., and is sold under the name of Novo Flud-Lite lighting unit. The standard lighting unit is built in several sizes up to 25 kw, either 125 or 250-volt direct current type. All of the engines are of sufficient size to operate the generator at full load continuously. A flexible coupling is used to connect the engine to the generator. The engine is equipped with a lock-up steel house. The engine and generator are mounted on an electric welded base with welded-in tubular cross members, making it much stronger than a bolted or riveted base and lighter in weight.

The power units are Novo single, 2 and 4-cylinder engines. Each engine is provided with an ample size radiator for continuous full load running without attention. The fuel tanks are of sufficient size to take care of all the requirements. Lubrication is automatic and positive. The crank shaft of these engines is mounted on the Timken tapered roller bearings. To eliminate the dangerous flickering and burning out of bulbs the engine is automatically controlled, keeping a constant speed and practically eliminating voltage variation.

Novo Flud-Lite lighting units can also be used to generate electricity for small electric tools such as concrete surfacers, electric hammers, hand saws, tie tampers and other equipment. These outfits are furnished for either AC or DC.

You Wouldn't Buy a Grader for This—



But, if you have a WARCO you can do it very well indeed. For heavier snows a WARCO V-Type Snow Plow, that is controlled from the operator's station, can be mounted in front. WARCO Steel or Rubber Crawlers help a lot, too.



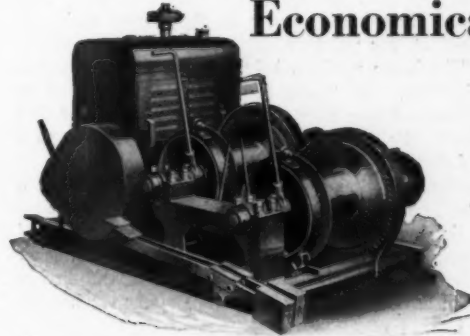
Let us tell you more about these year-around Road Building and Maintaining Machines.

W. A. Riddell Company, Bucyrus, Ohio

Power and Drawn Graders, Wheeled Scoops, Rear-Type Crawlers for Tractors

HOISTS BUILT ESPECIALLY FOR CONTRACTORS

Dake Hoists are Powerful, Dependable Economical!



TOMORROW'S profits come from today's decisions. Decide today to investigate the advantages and economies that come with the use of **DAKE HOISTS**.

Investigate **DAKE** arc-welded steel frames, steel drums, extra horse power per pound of weight, unusual portability and economical operation. Investigate the reasons why **DAKE HOISTS** pay such large profits per dollar invested.

Write today for the new **DAKE** catalog. Inform yourself about **DAKE** gasoline and electric hoists ranging from 2 to 27 hp. and priced from \$250.00 to \$1,900.00 f.o.b., factory.

DAKE ENGINE COMPANY *Grand Haven Michigan*

When writing to advertisers please mention the **CONTRACTORS AND ENGINEERS MONTHLY**—Thank You.



A Star Shovel with Ditcher Scoop Just After Completing 1,028 Feet of Water Line Trench, 5 Feet Deep in the Rock Shown Below

A Ditcher Shovel with Patented Scoop Control

A CURVED rack which enables the operator to regulate his boom reach and his dumping clearance is an exclusive patented feature of the Star ditcher shovel made by the Star Drilling Machine Co., Akron, Ohio. As shown by illustration, the Star ditcher scoop always holds its effective ditching angle. The cutting edge works freely at all times and is not hindered by resistance on the heel, as the heel does not drag during the entire stroke.

The Star ditcher is of the boom and "pull-to" type. The rear end or the pivotal axle clamps to the curved rack. It can be fastened at any point on the rack which the operator may select. The boom reach and dumping clearance are thus rendered adjustable. In effect, the boom is lengthened or shortened. The maximum dumping clearance of 10 to 12 feet can be attained. So great a clearance is not possible with most types of ditching shovels.

In sub-digging, the Star stays on top and goes down to excavate cellars, trenches and canals, as low as 18 feet below the base of the machine. The balance and construction of the machine make this possible in steady digging. The bucket fills quickly, leaving a smooth finished grade, and the ditcher always keeps in advance of the work. The spill may be side cast or loaded.

This shovel may also be used for back-filling. The back-filler can be put on and taken off in 15 minutes. Being 5 feet wide and 2½ feet high, it scoops from 1 to 2 yards at a stroke. It has filled 1,000 feet of water line ditch in 5 hours. The backfiller reaches out 31 feet from the center pin, and makes from 3 to 5 strokes per minute. The length of the stroke is 16 to 18 feet.

The scoop used for trenching and sub-digging is of the drop bottom type, and standard scoop sizes are: 16-inch cutting a 22-inch trench, 22-inch cutting 28-inch, 28-inch cutting 34-inch, and 36-inch cutting 42-inch. The teeth are special alloy forged steel with high abrasive resistance qualities and can be re-dressed and tempered.

The Star is equipped with crawler treads 15 inches wide and can be easily moved in difficult places. It also may be readily transported from one job to another.



A Quick Portable Source of Night Illumination

WHEN illumination is required on your job it must be available at once, without delay or fuss, from a source that can be operated by any one of the crew.

The Sullivan Machinery Co., 814 Wrigley Bldg., Chicago, Ill., has placed on the market "Sullite" electric plants which can furnish a quick portable source of night illumination.

These plants are air-cooled and made in 350, 750, 900 and 1,500-watt sizes with direct current. The engine is of the single-cylinder, 4-cycle, air-cooled type, especially designed for this duty and accurately built for sustained operation with little attention. On all sizes the engine is of adequate horsepower to deliver the full rated capacity continuously, and even a reasonable overload when required. The magneto is of the high tension type and built into the flywheel. It supplies a fat hot spark that makes starting easy. Double cooling blowers are provided so that the engine is kept cool when pulling the full



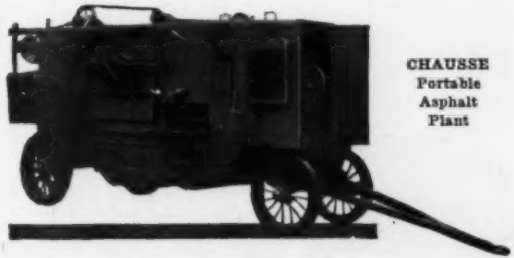
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Write for Catalog No. 280**

It tells all about

Baker Maney Self-loading Scrapers
Baker One-man Rotary Scrapers
Baker Bulldozers and Backfillers
Baker Road Maintainers and Planers
Baker Snow Plows for Trucks and Tractors



The Baker Manufacturing Co.
585 Stanford Ave., Springfield, Ill.



CHAUSSE
Portable
Asphalt
Plant

**Indianapolis Also
Repairs Streets With a
CHAUSSE Portable Plant**

Indianapolis is another user of the most modern and efficient street patching unit. It was purchased as an auxiliary to a city stationary plant where large overhead makes operation inadvisable for small or winter repairs.

Chausse portable asphalt plants are most economical as auxiliaries for suburban or winter work, or to do entire maintenance in smaller cities. It will pay you to investigate.

Other products—Oil Burning Tar Kettles, Surface Heaters, Fire Wagons, Concrete Mixer Heaters, Kerosene Torches. Write for illustrated catalogs.

Chausse Oil Burner Company
Elkhart Indiana



DUMPING EQUIPMENT
to fit YOUR needs

Back of every Wood dumping unit is 19 years' practical experience.

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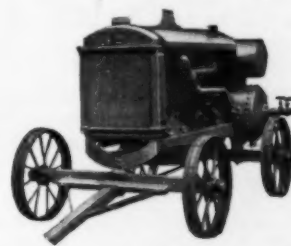
Hoists and W Type dump bodies for chassis of 3 ton and up;
Hoists and L Type dump bodies for 1½ to 3 ton chassis;
Hoists and C Type dump bodies for 1 and 1½ ton chassis.

Wood national service is at your elbow in principal cities of the United States and throughout the world. An organization of service for dump truck men.

WOOD HYDRAULIC HOIST & BODY CO.
DETROIT U. S. A.

Thor

AIR COMPRESSORS



*The Only Compressor With a
Super-Charger*

The most powerful compressor of its size on the market. The Super-Charger enables the THOR to deliver 20 per cent more air than any other compressor of the same size. It is the reason why the THOR does deliver more air and does operate more tools. Investigate the THOR before you buy your next compressor.

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PNEUMATIC TOOL CO.**
New York 37 YEARS OF LONDON
PNEUMATIC TOOLS ELECTRIC *Thor* TOOLS AIR COMPRESSORS

248 S. JEFFERSON ST.

CHICAGO, ILL.



A Model SY Sullite Portable Electric Light Plant

rated capacity load in the hottest climate.

The generators are especially built for the severe service for which these plants are so frequently used. They are of the compound wound type, and especially insulated to withstand a great deal of moisture and heat. The commutator design is the result of careful study to assure a smooth, flickerless flow of current at all times.

Sullite plants are completely self contained and ready for operation when received. The current is supplied direct from the generator, eliminating storage batteries entirely. Any of the models from the 350-watt to the 1,500-watt unit can be supplied with sheet metal housing. This housing even without the side covers is usually sufficient to protect the plant from the weather. A canvas cover for the sides may be used when necessary. Removable metal side covers, completely enclosing the plant, can be supplied on special order.

All Sullite air-cooled electric plants are provided with a convenient hand or foot lever starter. This arrangement assures starting the engine quickly and conveniently with no danger of kick back. A convenient plugging socket is located on the side of the generator. This arrangement makes it very convenient to connect the lighting or load line and adds greatly to the portability of these plants.

New Crawlers for a Diesel Dragline

THE E-2 diesel dragline of the Bucyrus-Erie Co., South Milwaukee, Wis., is now regularly equipped with a new style improved crawler type mounting. This mounting

comes with standard or special long belts and with special wide treads.

The standard mounting has 27-inch treads, giving an overall width of 10 feet, 6 inches with an overall length of 13 feet, 8½ inches and a bearing area of 51.9 square feet. There is also a long truck with 27-inch treads, and this, as well as the standard truck can ride on a flat car without removing the treads. The long truck with the 27-inch treads has,



Underside View of the Crawler Tracks of the Bucyrus-Erie E-2 Dragline

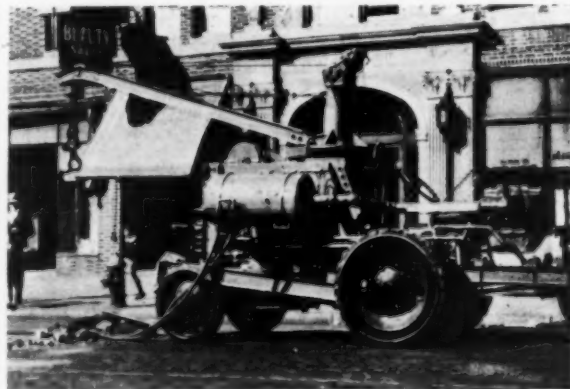
the same width as the standard, but is 15 feet ¾ inch in overall length with a bearing area of 57.9 square feet.

Two styles of the wide tread are also offered. The standard length truck with wide treads has an overall width of 11 feet, 8 inches with an overall length of 13 feet, 8½ inches and a bearing area of 63.3 square feet. This wide truck, wide tread mounting also comes in the extra long size, giving a bearing area of 70.8 square feet with an overall width of 11 feet 8 inches and an overall length of 15 feet ¾ inch.

The machine steers from the cab, having several interesting developments for more convenient steering. The new mounting is chain-driven, being somewhat similar to the crawler mounting used on 1,020 and 1,030.

A Combined Portable Swing Crane and Air Compressor

NUMEROUS construction and maintenance jobs require the use of hoisting machinery and air compressors working intermittently, at short intervals. It is the usual



The Loadmaster Mounted Crane and Air Compressor

practice to haul portable air compressors to a given locality and carry the air from them through lengthy sections of hose. Hoist machinery frequently stands idle, having nothing to do, or having to wait until conditions are made ready for its employment. By combining the elements of crane and compressor into a single, compact, mobile unit, Frederic H. Poor, Inc., 342 Madison Avenue, New York, has produced a device which, because of its ability to play a dual role, lends itself to continued service.

Mounted on a McCormick-Deering 10-20 industrial tractor, the Loadmaster crane is in use by many contractors, municipalities, and railroads. This crane affords an easily maneuvered, extremely mobile form of hoist. It is fitted with a 10, 12 or 14-foot boom as required, and is capable of handling such loads as cannot be dealt with advantageously by hand labor. The crane is rated at 3,500 pounds capacity. The revolving boom easily swings and spots loads. Specially designed stabilizers acting upon the front axle give a 4-point suspension when handling loads over the side. They are operated by means of a single lever within easy reach of the operator. Thus no stifflegs are required when hoisting over the side. All levers for the operation of the Loadmaster crane are at one point requiring a single operator.

These services have been extended by the addition of a 160-cubic foot capacity air compressor mounted as an integral part of the unit. The compressor is rigidly mounted on the rear of the tractor, the air tank being carried on the left side of the body of the crane. The device is capable of handling 3 paving breakers, 4 riveting hammers or 2 rock drills.

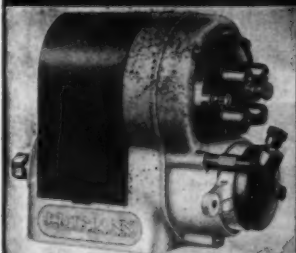
SPEED!! RESULTS!!

Did you ever see snow handled like this? Well, with a ROSS SNOW PLOW scenes like this are common. Why not investigate!

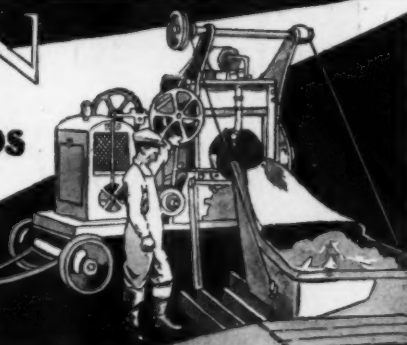
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"HVASS" SPREADERS

*Conquer Slippery
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Spread full width street or road at
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SAND, ASHES OR CINDERS

Can be quickly attached or detached

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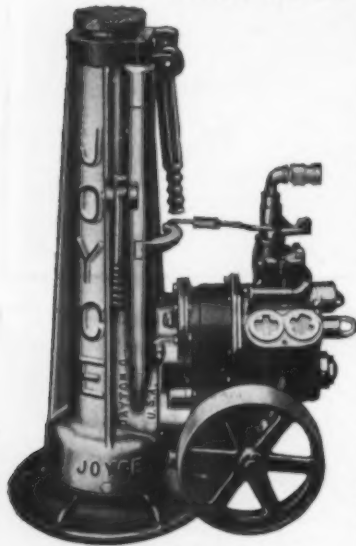
CONCRETE CARTS
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BIN GATES

Write for Bulletins

THE LAKEWOOD ENGINEERING CO., 520 Dublin Ave.,

Columbus, Ohio

Air-Motor-Driven Jack Hoists for Pushing Pipe and Culvert



A New Air-Motor-Driven Jack Hoist

A NEW method of pushing pipe and culvert has been developed recently, using Joyce air-motor-driven jack hoists, manufactured by the Joyce-Cridland Co., Dayton, Ohio. The Collier Construction Co., of Cleveland, working on a 26-mile pipe pushing contract at Detroit, used three Joyce jack hoists for pushing the pipe. It is reported that savings as high as \$200 per day with each hoist used were made. The J. A. Mercier Co., of Detroit, is using two of the hoists for similar work. Savings ranging as high as \$2 per foot pushed have been reported

where the hoists are used for pushing culvert.

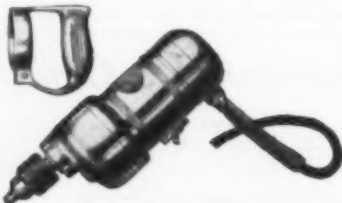
Joyce jack hoists are a single unit composed of a specially built jack, a series of gears and a $3\frac{1}{4}$ -horsepower heavy duty Ingersoll-Rand reversible air motor. Automatic shut-offs at both upper and lower limits of the ram assure positive safety. Compressed air furnishes the power for operation; no manpower is required. One man controls one, two, or a series of any number of hoists from a Y valve or, when operated singly, at the motor if desired. Hoists of 50 and 100 tons capacity extend to their full length under maximum load in three minutes. Under lighter loads the hoists extend in as little as one minute. Hoists are built in any desired capacity up to 100 tons.

A High Speed Wood Drill

A DRILL has been recently brought out by the R. L. Carter Co., Inc., New Britain, Conn., to meet the demands for a high speed drill in the woodworking field, particularly where hard woods are used. It is also adaptable to use in form work.

The drill is enclosed in a polished case so that dirt and grease do not readily adhere to the surface, but if it does can readily be wiped off. The speed of 6,000 rpm is such that it literally punches holes through the wood.

The high speed makes it an ideal tool for use in drilling lead holes for screws, as it cuts so fast that it does not wedge and consequently does not split the wood. The switch is mounted on the casing in such a position that it always is under the control of the operator. The handle can be removed so that the drill can be used either with or without it.



The New Carter Wood Drill

A Crack Filling Machine

A MACHINE designed to fill cracks in roads with heated materials and follow immediately with sand or chips that will adhere to the hot mixtures and fill the crevice full has been placed on the market by the Burch Corp., Crestline, Ohio. The manufacturer claims that the unpleasant and wasteful methods employed in filling cracks are overcome with this machine, as the operator merely pushes the machine to the heater and fills up one tank with hot tar or asphalt and the other with chips and then starts his operation. It makes no difference what the size of the crack may be, nor how crooked it may be, he is prepared to follow it, placing the right amount of bituminous material or stones in the proper place and with the chips following the heated tar immediately and in the right amount until the job is completed in a crack reaching across the road in a few moments. The chips are dropped a few inches behind the bituminous material and the amount of either tar or chips is regulated by turning the handle slightly to either side. Thus the operator has complete control of the flow of the material at all times.



The Burch Crack Filling Machine

The Burch crack filler is built with a frame consisting of two pieces of $\frac{3}{4}$ -inch pipe properly shaped to form a pair of handles, to the lower side of which frame is electrically welded a bow-shaped standard on which the rear of the machine rests. Two wheels 14 inches high are placed on an axle attached to the front end of the handles, which form a driving mechanism for the feed in the stone compartment. A loose handle, or grip, is attached to the rear of the main handle or pipes, and to this grip is attached a rod. By turning the grip slightly sidewise on the right handle, the valve in the car container is opened. On the left handle the clutch controls the feed from the stone compartment.

The tar is fed from a spout below the control valve in a thin stream that will easily flow into the narrowest crack. This spout and valve can be heated sufficiently to keep the material flowing thinly by a blow torch attached back to the tank, forcing the flame through a flue cast in the base of the hopper, down to the valve, preventing the cooling of the material or its congealing around the valve if the machine is allowed to stand for a short time.

Between the two handles on a cross member there is a short lever controlling the fluted feed roller that may be disengaged if for any reason it is desired to stop the flow of stone, pouring tar only or when the machine is being wheeled to the place of beginning operations.

The position of the two material compartments is such that the operator has a full view of the crack some distance ahead of the machine and it is easy to so move the machine that the most crooked crack can be followed without difficulty.

Dependable Power

in sizes ranging
in HP. from
3 to 180

Le Roi Company
Milwaukee

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for dependable power!

Combination Hot and Cold Mix ASPHALT PLANTS

One Drum Used

Materials dried and cooled to proper temperature for all types of Cold Mixed Tar and Asphalt Materials.

We manufacture five sizes—100-200-300-400-600 tons per day. Mixers on all sizes up to three tons.

ASPHALT EQUIPMENT COMPANY
Scottdale, Penna.



**For Material Handling
Machines**

Twin Disc Clutch Co.
Racine, Wis.

CONTRACTORS AND BUILDERS

If you haven't checked over pages 116 to 119, please do so without further delay, for you will find there a convenient list of items describing the most recent changes and improvements on all types of machinery and equipment used throughout the United States.

25-30 HP. Double Drum Hoist



LINE PULL
4000 LBS.

LINE SPEED 140 TO
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Other Sizes Also Priced Low

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HIGH CARBON
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THRUST WITH
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The "Champion" Challenges Competition!



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Check over the WILLIAMS
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find 21 distinctive improvements
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guarantee—

That it will Outdig and Outlast any
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Style "J" Oil
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equipped with
Hand Spraying
Attachment
will guard any
highway with
economy and
efficiency.
Something
easy to handle
and quick to
heat.

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Oil Burning Kettles, Oil Burners, Torches, Pouring
Pots, Hand Spraying Attachments, etc. Send for
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**"ANVIL BRAND"
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FOR MANILA OR WIRE ROPE
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**STRENGTH—SERVICE
—SAFETY—**

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SOLVE THE WINTER
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MADE IN
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SIZES—
TO OPERATE
WITH ANY SIZE
AND DESIGN
OF CONCRETE
MIXER—
EITHER TILT-
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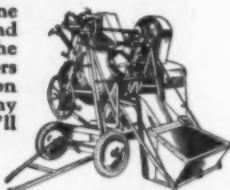


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F. O. B. FACTORY
on STEEL

\$179.50
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**Saving
only Starts with the Price**

YOU can't beat this genuine Jaeger trailer as a "buy". And it's even harder to beat it on the job, mixing concrete. Contractors say there's a Jaeger 3½S trailer on every street in town. Talk to any man who owns one and you'll know why.



NON-TILTERS
7, 10, 14, 21, 28,
36S sizes. Ask
about 1-bag Speed
King trailer.

TILTERS—with Skip
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Mix drum. Sizes 3½, 5, 7,
10 ft.



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These especially selected catalogs and pamphlets
of value to contractors are for free distribution.
You will find it worth while to check these lists
each month and write for the catalogs you need.

BOB-TAIL ELECTRIC AND GAS-POWERED SHOVELS

The Thew Shovel Co., Lorain, Ohio, has announced a line of bob-tail electric and gas-powered shovels particularly adapted for underground mining, tunnel and subway construction or any job that necessitates the operating of a machine in close quarters. The units offered are the Lorain-75-B, Lorain-55, and Lorain-45, their standard 1¼-yard 1-yard, and ¾-yard machines, modified in a few respects to meet the unusual working conditions found in this field. Complete descriptions may be secured direct from the manufacturer.

AN ELECTRODE FOR ARC WELDING OF MILD STEEL

The Fusion Welding Corp., 103rd St. and Torrence Ave., Chicago, Ill., has recently published a circular describing its Weldite green surfaced electrode for metallic arc welding of mild steel. This bulletin describes in detail the effect of green surfacing on the welding arc, the deposit metal and operating characteristics of the electrode, and the manner in which it reduces welding costs.

MIXING CONCRETE IN TRANSIT

The Lee Transit Mixer which it is claimed saves 25 to 40 per cent of the cost of handling concrete and which is mounted on a truck body mixing the concrete between the central proportioning plant and the job, is described completely in a new circular recently issued by the Lee Transit Mixer Co., 129 E. Market St., Indianapolis, Ind.

TAKE YOUR POWER WITH YOU

Northwestern power and light units containing a gasoline engine and motor generator and made in 1½, 3 and 5-kw sizes are described completely in folders which may be secured from the Northwestern Manufacturing Co., Milwaukee, Wis.

LIGHT WEIGHT DUMPING UNITS FOR CONTRACTORS

A complete line of dump bodies known as the C-type has been announced by the Wood Hydraulic Hoist & Body Co., Detroit, Mich. The bodies are ruggedly constructed of 10-gage high resisting steel electrically welded and built for general contracting service, hauling of wet mixed concrete and general gravity dumping requirements.

A NEW POWER SCOOP SHOVEL

The new Clarktor shovel with a bucket holding 9 cubic feet or 1,500 pounds which is designed to handle any loose fluid materials such as sand and is mounted on a Clark Tractor is described in literature which may be secured from the Clark Tractor Co., Battle Creek, Michigan.

A NEW SMALL SIZE PORTABLE AIR COMPRESSOR

The Independent Pneumatic Tool Co., 248 So. Jefferson St., Chicago, Ill., has announced a new small size air compressor with displacement of 74 cubic feet. This outfit which will operate one paving breaker, rock drill or riveting hammer is described completely in literature which may be secured from the manufacturer free upon request.

COMPLETE DATA ON METAL BASE EXPERIMENTAL ROAD

The American Rolling Mill Co., Middletown, Ohio, has prepared a 10-page booklet giving complete data on the metal base experimental road constructed in Sangamon County, Ill., recently. Copies of this may be secured direct from the American Rolling Mill Co.

A NEW BULLETIN ON ONE-HALF CONVERTIBLE CRANES

Bulletin FBE-10201 recently issued by the Bucyrus-Erie Co., South Milwaukee, Wis., completely describes the 1020 Bucyrus-Erie ½-yard convertible clamshell, lifting cranes, shovel, dragline, and drag shovel which may be equipped with gasoline diesels or electric power plants.

AN ELECTRIC PIER-HOLE PUMP

Bulletin 30-PH issued by the Domestic Engine & Pump Co., Shippenburg, Penna., completely describes the new Domestic electric pier-hole pump which has a 2½-inch suction and a 2½-inch discharge and which can be placed in a hole only 12 inches in diameter delivering 250 gallons per minute out of the hole 10 feet deep and 100 gallons out of a hole 50 feet deep.

A NEW SIX-CYLINDER MACK TRUCK

Mack Trucks, Inc., 252 West 64th St., New York, has announced a new Mack Model AK six-cylinder job designed for heavy duty service where greater speed and power is essential. Complete information may be secured from the manufacturer.

A LIGHTWEIGHT TRAILER FOR TEN-TON SHOVELS

A new style rubber tired trailer for transporting Model 40, ¾-yard shovels and cranes which weigh 10 tons has been announced by the Byers Machine Co., Ravenna, Ohio. Literature describing and illustrating it will be furnished free on request.

SELF-CONTAINED PORTABLE ELECTRIC PLANTS

Sullite electric plants made in 350, 750, 900, and 1,500-watt sizes, direct current, each with a single-cylinder, 4-cycle, air-cooled engine and compound wound type generators for use on construction jobs are completely described in Bulletin 100-B issued by the Sullivan Machinery Co., 814 Wrigley Bldg., Chicago, Ill.

MOTOR-DRIVEN JACK HOISTS FOR PIPE PUSHING

Joyce air-motor-driven jack hoists made by the Joyce-Cridland Co., Dayton, Ohio, for handling loads of 15 to 100 tons are now being used extensively for pushing pipes and culverts by contractors. A complete description of Joyce jack hoists of the air-motor-driven, ball-bearing, in Catalog No. 54 published by the Joyce-Cridland Co.

SMALL SIZE WEIGHING BATCHER

The Tilt-Weigh batcher recently announced by the Knickerbocker Co., Jackson, Mich., and made in 2-bag and 3-bag sizes for weighing batches for any power ship mixers is completely described in literature which may be secured from the manufacturer upon request.

A SIDE BOOM UNIT FOR TRACTORS USED IN PIPE HANDLING

The W-K-M Co., Inc., 220 Roberts St., Houston, Texas, will be pleased to send complete information regarding its new side boom unit for attachment to the model "U" Allis-Chalmers industrial tractor especially designed for pipe line work and also for general construction use, highway maintenance, et cetera.

A NEW HIGH SPEED ELECTRIC DRILL

The R. L. Carter Co., Inc., New Britain, Conn., will be pleased to send complete information regarding its new woodworking drill which operates at a speed of 6,000 rpm, literally punching holes through wood and making it an ideal tool for drilling lead holes for screws as it cuts so fast that it does not wedge and consequently does not split the wood.

HEAVY DUTY ENGINES AND POWER UNITS

Bulletins SP-123 and HP-123-A, the former of which describes the Hercules heavy duty engines and power units and contains advice as to the selection of the proper type of Hercules power plant for any requirement and the latter a handy chart, may be secured by those interested from Hercules Motors Corp., Canton, Ohio.

TWO-STAGE AIR COMPRESSORS

Bulletin No. 153, describing the Pennsylvania two-stage air compressors of the straight-line, tandem type which are made in a variety of sizes, capacities and ratings, may be secured by those interested from the Pennsylvania Pump & Compressor Co., Easton, Penna.

A HIGH PUMPING TRACTOR-MOUNTED SHOVEL

The new Trackson high shovel, Model 20, mounted on a McCormick-Deering tractor, which digs, moves, and loads materials and may be either equipped with crawlers or wheels is described completely in literature which may be secured from the Trackson Co., 1323 South First St., Milwaukee, Wis.

A NEW PORTABLE HAND-POWER SAW

The Speedmatic power saw Type K-9 has recently been announced by the Porter-Cable-Hutchinson Corp., Syracuse, N. Y. It is of the gear driven type, has a 1½-horsepower motor and is geared to the drive arbor through hardened spiral gears. Complete information may be secured from the manufacturer.

A NEW TRACTOR POWER TAKE-OFF

A new double cable winch power take-off for Caterpillar tractors has been designed and is being built by R. G. LeTourneau, Inc., 122 Moss Avenue, Stockton, Calif. This winch replaces the inspection plate located on the rear end of the tractor and has two 6-inch drums. Complete information may be secured from the manufacturer.

A BELT POWER DRIVE FOR CONSTRUCTION EQUIPMENT

The Dayton Rubber Manufacturing Co., Dayton, Ohio, will be pleased to send its publication 104 completely describing the Dayton Cog-Belt drive which may be used on any construction job where a fractional to 500-horsepower drive is needed. The Dayton Cog-Belt drive is built with a compression section, a tension section, and a neutral section.

A ONE-MAN OPERATED TRACTOR SCRAPER

There are nearly ten thousand Schaefer tractor scrapers in use today, as this earth-moving tool which is handled by one man is handy and easy to run and low in upkeep cost. The circulars of the Gustav Schaefer Co., 4180 Lorain Avenue, Cleveland, Ohio, describe this automatic scraper in detail.

ASPHALT FOR ALL CONSTRUCTION NEEDS

Contractors should be familiar with the various asphalt products of the Standard Oil Company of New York, 26 Broadway, New York, which includes Standard Asphalt Binder A for surface treatment, Binder B for penetration work, Binder C for the mixing method, joint filler for brick or block pavements, cold patch asphalt for repairing all types of bituminous surfaces, and refined asphalt for sheet asphalt paving.

ALL KINDS OF JACKS

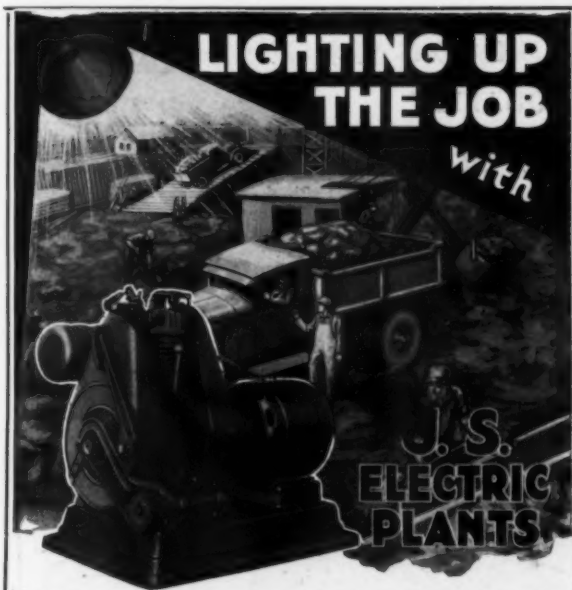
Simplex jacks for construction work including lever jacks, pipe pushers, and trench braces and screw jacks with the visible screw are described in the literature of the Templeton, Kenly & Co., Chicago, Ill.

CAST IRON PIPE MADE CENTRIFUGALLY

The strength, flexibility and greater carrying capacity of the deLavaud centrifugally cast iron pipe made in a metal mold and encased in a water jacket, are among the reasons for its wide use today. The new deLavaud handbook gives complete information on this type of pipe and may be secured from the United States Pipe & Foundry Co., Burlington, N. J.

BETTER METHODS PRODUCE BETTER CONCRETE

Literature which may be secured from the Universal Atlas Cement Co., 210 South La Salle Street, Chicago, Ill., shows how better concrete can be made at no greater expense to the contractor. These booklets will be sent upon request to any contractor who is interested.



LIGHTING UP THE JOB
with
J. S. ELECTRIC PLANTS

\$137.50

is the list price for the above 350-watt model capable of lighting fourteen 25-watt lamps. No batteries necessary.

Whether a quick, portable source of night illumination is needed . . . or a lighting arrangement for consistent, night operation to keep up construction schedules—"U. S." Electric Plants fill the bill 100 per cent.

Their steady current output, flickerless light and constant voltage under all load conditions have made them preferred over all other units for lighting up the job.

The "U. S." Line offers models for any purpose. Watt capacity ranges from 350 watts up to whatever size is needed. An interesting booklet entitled, "Lighting up the Job" has been prepared specially for engineers and contractors. Write for it.

Dealers write for franchise particulars and special discounts

UNITED STATES MOTORS CORP.
131 Nebraska St. Est. 1890 Oshkosh, Wis.

LOADING

DUMPING



SPREADING

LEVELING

One-Man Automatic Tractor Scraper

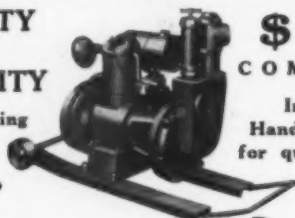
Nearly ten thousand in use the world over, developing roads, streets, grading parks, golf courses and airplane landing fields and in fact doing anything that is possible with a scraper of this type.

It will pay you to investigate this outstanding tractor scraper. Do it today!

Four sizes: scraper widths, 4, 5, 6, 7 feet

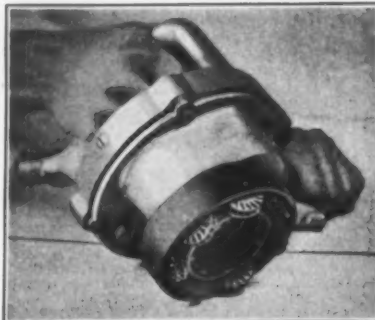
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The Gustav Schaefer Company
4180 LORAIN AVENUE CLEVELAND, OHIO

15,000 GALLONS per HOUR**QUALITY
AND
SIMPLICITY**Timken Bearing
Equipped
Stainless
Steel Pump
Shaft3-inch Suction
3-inch DischargeHANDLES DIRTY
WATER EASILY**\$159
COMPLETE**Including
Hand Air Pump
for quick priming
on high
suction lifts**Positive
Priming****STERLING MACHINERY CORPORATION**

2300 Holmes St.

Kansas City, Mo.

**TOUSLEY
"7-A"
SURFACER**We have a
complete
line of
Concrete
Surfacing
Machines

Write for Catalogs

THE TOUSLEY TOOL COMPANY

1965 East 66th Street

Cleveland, Ohio

Lansing's NEW 3½-T MixerLarge mix-
ing drum
Hyatt roller-
bearings,
Alemite fit-
tings, Lauson
2-hp. engine
with Wico
high-tension
magneto.
WRITEtoday for full in-
formation.**LANSING COMPANY, Lansing, Mich.****HEAVY BITUMINOUS
DISTRIBUTORS****THE MODERN METHOD OF BUILDING
BETTER ROADS**

Asphalt heated to 340 degrees and applied with Etnyre Model F. First application 2 gallons per sq. yd., second application .7 gallons per sq. yd. Both applications made with 18 ft. spray bars. Write for catalog.

E. D. ETNYRE & COMPANY,
Oregon, Illinois**Do you check over this list each month?
Get the Habit. It will save you money to
be up-to-date on equipment****AN OSCILLATING BLADE BACKFILLER FOR TRACTORS**

The improved LaPlant-Choate backfiller with oscillating blade made by the LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa, is described and depicted in detail in a recent Folder No. 12 issued by that company.

REFINEMENT IN 1½ TO 8-HORSEPOWER INDUSTRIAL ENGINES

Complete description of the various models of Stover industrial engines from 1½ to 8-horsepower and made in the single or double cylinder type with interchangeable parts may be secured by writing to the Stover Manufacturing & Engine Co., Freeport, Ill.

A CRACK FILLING MACHINE

The Burch Crack Filler, an entirely new device for applying a hot bituminous material and chips to a crack in a road, is described completely in a circular of the Burch Corporation, Crestline, Ohio.

**CURRENT PRACTICE IN USING CALCIUM CHLORIDE FOR CUR-
ING CONCRETE**

An 8-page pamphlet of particular interest to contractors and engineers entitled "A Report on the Current Practice of Using Calcium Chloride for Curing Concrete in Pavements, Building Construction, Bridges, Culverts and Concrete Products," Bulletin No. 30-750, may be secured from the Columbia Products Company, Barborton, Ohio, which is the sales section for special products of the Columbia Chemical Division of the Pittsburgh Plate Glass Company.

A DITCHER SHOVEL WITH PATENTED SCOOP CONTROL

The Star power shovel which may be used as a grader, dipper, trencher and sub-digger is completely described in Bulletin No. 53 issued by The Star Drilling Machine Co., Akron, Ohio. The ditcher is of the pull-to-type and has a scoop which fills quickly and digs to grade.

A LIVE BOOM FOR PIPE LAYING TRACTORS

A live boom which moves up and down to pick up or lower the pipe and which is mounted directly on the crawler frame of the Fordson tractor and is known as the Berg boom is made by the Resistor Engineering Corp., Tulsa, Okla., from which company complete information may be secured.

PORTABLE ELECTRIC LIGHTING UNIT

Novo Flud-Lite lighting units which are used on construction work, on cranes, shovels, bridges, dredges, in the oil fields, camps, tunnels and excavations are completely described in the literature which may be secured from the Novo Engine Co., 216 Porter St., Lansing, Mich.

FOUR-WHEEL DRIVE FOR INDUSTRIAL TRACTORS

The Rightway Corp., 228 N. La Salle Street, Chicago, Ill., has developed an auxiliary drive for wheel-driven industrial tractors which gives four-wheel drive at the rear of the tractor and makes it impossible to stall the tractor unless three of the four drive wheels slip. It uses the live load for increasing the traction. The Rightway multi-wheel drive is described in an illustrated circular which may be secured from the manufacturer.

A NEW IDEA IN BOLTS

The new Seal-Tite bolt especially designed for wood construction with a flat head which countersinks itself and flange prevent the bolt from turning is made by the Lewis Bolt & Nut Co., Minneapolis, Minn., which will be glad to furnish complete information.

A SCARIFIER WITHOUT LEVERS

The Trojan Grade-Ripper, a scarifier in which the levers are removed in the interest of safety and a control wheel is substituted, is completely described in literature which may be secured from the Contractors Machinery Corp., Batavia, New York.

**A PORTABLE SWING CRANE AND AIR COMPRESSOR COM-
BINED**

Frederic H. Poor, Inc., 342 Madison Avenue, New York City, will be pleased to send a complete description of the new combined Load-master swing crane and air compressor mounted on a McCormick-Deering 10-20 industrial tractor to any contractor interested in this easily maneuvered entirely mobile form of hoist and air compressor.

ROCK CRUSHING AND SCREENING EQUIPMENT

General Catalog No. 4000 recently issued by the Traylor Engineering & Mfg. Co., Allentown, Penna., completely describes the company's wide variety of equipment for use in the rock crushing field as well as mining, smelting and cement machinery.

DO YOU NEED A HOISTING ENGINE

When you are in need of a new hoisting engine, whether steam, gas or electrically operated or a dredge hoist, belt-driven hoist, winches, or cableway hoists, send for the catalog of the J. S. Mundy Hoisting Engine Co., 722-32 Frelinghuysen Avenue, Newark, N. J.

CUP GREASE THAT GIVES ECONOMICAL LUBRICATION

Circular 107-R issued by the Joseph Dixon Crucible Co., Jersey City, New Jersey, describes Dixon's graphite cup grease which spreads its cooling, smooth, wear-resisting lubrication to every part of the bearing, preventing overheating and scoring, giving complete lubrication.

A SELF-FEEDING BUCKET LOADER

The Nelson K-2 loader which moves itself, and feeds itself and is run by one man doing the work of 20 shovelers is described in a catalog issued by N. P. Nelson Iron Works, 822 Bloomfield Ave., Passaic, N. J.

**Do you check over this list each month?
Get the Habit. It will save you money to
be up-to-date on equipment**

THOROUGHLY BUILT ELECTRIC-DRIVEN CAISSON

Leaflet CP-350 issued by Yeomans Brothers Company, 1433 Dayton Street, Chicago, Ill., describes Yeomans electrically driven caisson pumps which are built within a forged steel yoke with lifting ring and two 10½-pound side channels which keep the motor and pump aligned and make a compact unit.

A NEW THREE-WHEEL INDUSTRIAL TRACTOR

Information regarding the Sterling-Tiger three-wheel industrial tractor, which is 76 inches long and 45 inches wide and fully equipped, may be secured from the Sterling Tractor Equipment Company, 62 Bush Street, Brooklyn, N. Y.

NEW LINE OF AIR-COOLED INDUSTRIAL ENGINES

The new Wisconsin air-cooled motors for conveyors, concrete mixers, saw rigs, pumps, compressors and road machinery made in 1½ to 5-horsepower sizes are completely described with specifications and power curves in a new piece of illustrated literature which will be furnished on request by the Wisconsin Motor Company, Milwaukee, Wis.

PORTABLE ROAD ASPHALT PLANTS

The Doorley portable road asphalt plant made in 450, 850, 1,500 and 2,000 square yard sizes is completely described in a series of bulletins which may be secured from the Asphalt Equipment Co., Scottsdale, Pa.

A POWER EARTH BORER FOR HORIZONTAL HOLES

The improved Young's road crossing boring machine which bores holes up to any length for the insertion of pipes under railroads, paved highways, streets, etc., is completely described in illustrated Bulletin No. 15 issued by the Young Engine Corporation, Canton, Ohio.

SREADERS FOR SAND AND CINDERS

Hvass spreaders which are used to conquer slippery pavements, by cities, and also effectively for spreading fine stone in resurfacing roads are described in the literature of Chas. Hvass & Co., Inc., 508 East 19th Street, New York City.

FOUR TYPES OF MATERIAL HANDLING BUCKETS

No matter what your digging or rehandling problem may be you will find a bucket which will handle it effectively described in the catalog issued by the Hayward Company, 32-36 Dey Street, New York, N. Y. These include orange peel, clamshell, electric motor, and dragline buckets.

DEPENDABLE DOUBLE DRUM HOISTS

Double drum hoists for all types of contracting service are featured in the catalog of Street Bros. Machine Works, Inc., Chattanooga, Tenn., which will be sent on request.

A ONE-THIRD YARD POWER SHOVEL

The Fandom shovel, which is said to have fewer parts than any other shovel, is economical to operate, and will handle from 15 to 30 cubic yards an hour, is completely described in a folder which may be secured from the Fandom Hoist & Shovel Co., Lima, Ohio.

A SELF-PRIMING 4-INCH CENTRIFUGAL PUMP

The Homelite self-priming 4-inch portable, centrifugal pump with a capacity of 25,000 gallons per hour and a suction lift of 20 feet, powered by LeROI 10-horsepower, 4-cylinder gasoline engine and built to be easily moved by one man is completely described in literature which may be secured from the Homelite Corporation, 71 Riverdale Avenue, Port Chester, N. Y.

WARNING LANTERNS FOR WINTER NIGHTS

Diets Hy-Lo hot blast lanterns which can be put on the longer night shifts required from now on through the winter with the assurance that their red eyes will not fail to stay wide awake and warn traffic may be secured from R. E. Diets Company, 60 Laight Street, New York City.

HEATERS FOR YOUR CONCRETE MIXERS

Hotstuf concrete heaters which solve winter construction problems and burn oil and may be used with any size of concrete mixer, either the tilting or non-tilting type, are described in Catalog No. 15 which may be secured from the Mohawk Asphalt Heater Co., 60 Weaver Street, Schenectady, New York.

A NEW CLUTCH FOR INDUSTRIAL MOTORS

A new balanced expanding shoe clutch which is compact, light in weight and is adjusted without tools, has large surface contact resulting in low pressure and long life for every part has been announced by the Fawick Manufacturing Co., Waukesha, Wis., from whom information regarding its adaptability and construction equipment may be secured.

AIR FILTERS FOR AIR COMPRESSORS

Complete information regarding Protectomotor air filters, which are guaranteed to remove 99.9 per cent of the grit and dust from air on construction jobs and thus increase the life of air compressors from 3 to 5 times, may be secured from the Staynew Filter Corp., Rochester, N. Y.

A NEW MODEL INDUSTRIAL TRACTOR

The new Model-30 McCormick-Deering industrial tractor which retains all the features of the Model 20 but which in addition has greater power is completely described in literature which may be secured from the International Harvester Company of America, 606 South Michigan Avenue, Chicago, Ill.

ACQUA-PRUF

THE NEW

Concrete Accelerator and Hardener

An integral liquid compound to assist contractors in making better concrete. Acqua-Pruf is a compound that has an affinity for portland cement. One quart to the bag is the standard proportion that has by test produced a compressive strength 50% in excess of untreated concrete. This enables walks, paving, etc., to be opened to traffic in 24 hours.

Acqua-Pruf treated concrete can be poured at temperatures as low as 10 degrees above zero.

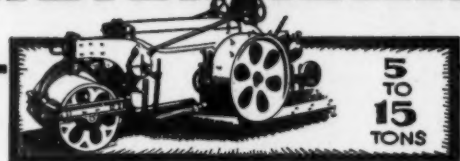
The manufacturers guarantee that Acqua-Pruf contains no acids or other elements in a form that will attack reinforcing.

ACQUA-PRUF, INC.,

393 Seventh Ave.

New York City

HUBER 4 CYLINDER MOTOR ROLLER



WRITE FOR CATALOG

THE HUBER MANUFACTURING COMPANY

330 E. CENTER ST., MARION, OHIO



The NATIONAL CARBIDE V. G. LIGHT

Gives you daylight conditions on night jobs. Spreads a full, even beam of about 8000 candle-power right where you need it.

Lights up the job for about nine hours on one 5-pound charge of National 14-ND Carbide and 5 gallons of water.

Is easily handled by one man; has nothing to get out of order; no harm done if it tips over—just stand it up again, and it goes right on working.

Weight 30 pounds empty; 75 pounds when full.

Write for Catalogs on V-G Light,
V-G Handy Light and Lantern

NATIONAL CARBIDE SALES CORP.
LINCOLN BLDG. NEW YORK

Opposite Grand Central

EXCAVATING for PROFIT



This Booklet May Show You the Way to Lower Excavating Costs

It is packed full of interesting and valuable information on the work of the Sauerman Slackline Cableway on practically every kind of excavating job. There are many pictures and diagrams showing just how this cableway digs, conveys and elevates. And it shows how many users are cutting costs. It may show you how, too. Send for your copy today.

SAUERMAN BROS., INC.

464 So. Clinton St.
Chicago, Ill.

**ANOTHER
ENDURANCE
RECORD—**
this time by
DOBBIE
Oil Reservoir Sheaves

Unloading Sand and Gravel from Barges—500-tons in 95 minutes with a 3-cubic yard Clamshell Bucket. Working 5 years without replacements—and still in service.

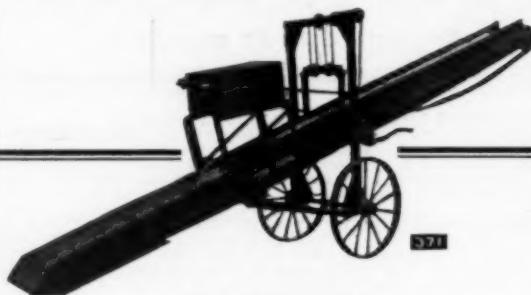


Write for Catalog

DOBBIE FOUNDRY & MACHINE CO.
NIAGARA FALLS, N. Y.

*Wire Rope, Sheaves, Blocks, Hand Winches
and Timber Derrick Fittings
Carried in Stock at Niagara Falls and New York City*

USE CONVEYORS



Manufacturers of
**PORTABLE AND STATIONARY
BELT CONVEYORS, BUCKET
ELEVATORS AND SCREENS**

Write for Descriptive Bulletins

**HANDLE
YOUR MATERIALS WITH
CHICAGO AUTOMATIC
CONVEYORS**

Chicago Automatic Conveyor Co.

Originators of the Portable Conveyor

1853 South 55th Ave.

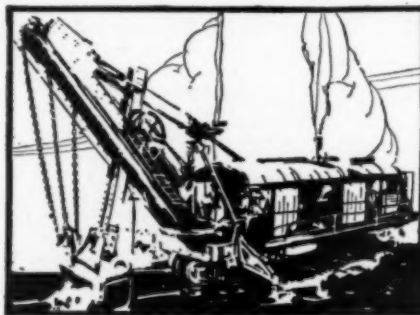
Cicero, Illinois

Agents in all principal cities

BARBER GREENE COMPANY
485 WEST PARK AVENUE
Aurora, Illinois

*About Ditching Costs
and Records*

*If you want to see how
the fast flying ditchers of the
Flying Diamond Fleet can help
to cut your own digging
costs, fill in your name
and mail this blank to
us for a copy of "Ditching
Snapshots and Records."*



**There's hardly a place on this shovel
where Dixon's Waterproof Graphite
Grease won't ease severe service**

For this lubricant has GRAPHITE as an element. It gives wearing surfaces a remarkable smoothness and protects them.

For gears chains and wire ropes exposed to every climatic condition, Dixon's Waterproof Graphite Grease not only lubricates, and prevents rust, but adheres to the moving parts at any speed. It is not wasted. It cannot gum—it always protects and lubricates.

There are Dixon Graphite Products for cranes, derricks, dredges, pump plungers, belts, pipe joints—for any type of machine or service—and there is economy in using them.

The quickest way to know the facts for yourself is to write for Circular 86-W and samples.

Joseph Dixon Crucible Co.

Established 1827

Jersey City



New Jersey

STEEL ROAD FORMS

A truly heavy-duty Form with extra-wide tread and double-flanged base. Stake pockets brace the form and distribute the load over the entire base. Stakes are heat-treated and can be driven through any kind of subgrade or through old concrete, macadam, or brick base. Investigate this unusual form. Write or phone for information.

THE HELTZEL - STEEL FORM & IRON COMPANY
WARREN, OHIO

THE Toledo Torch

— the ONLY safety light with the low-cost, constant-flare Economy Burner.

Insist on the Genuine Toledo Torch. If your dealer can't supply you, write us.

Stormproof
Theftproof
Economical
Unbreakable
Self-righting

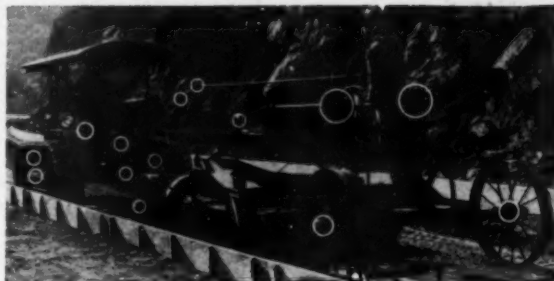


The Toledo Pressed Steel Co.
TOLEDO OHIO

Save with Steel

Manufacturers of The Toledo Horse—the ideal highway barricade

"D-A" CLINGS TO METAL



—AND KEEPS BEARINGS LUBRICATED!

Ordinary greases and compounds squeeze out or burn up in heavy-duty service. But not "D-A"! It *clings to metal*, keeps bearing surfaces apart, protects them against mud, water, sand and dust. Circles in illustration indicate vital working parts fortified against friction by "D-A." D-A LUBRICANT CO., INC., INDIANAPOLIS, INDIANA.

ORDER FROM YOUR DEALER — IMMEDIATE DELIVERY

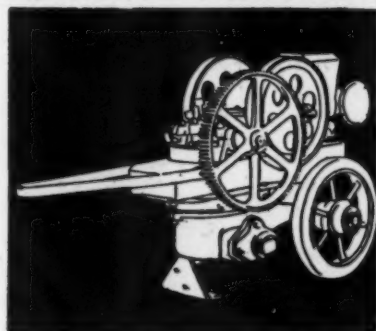
D-A LUBRICANT

FOR
ROLLER BEARINGS GEARS PRESSURE FITTINGS CHAINS CABLES

Rex 3" Diaphragm

\$170⁰⁰

LIST AT MILWAUKEE
with steel wheels



A brand new 3 in. diaphragm Pump on a new idea. 300 pounds lighter. Easier to handle and move. Diaphragm changed easily in 9 minutes. Merely loosen three nuts. No finger smashing. 2 h.p. Stover engine—completely enclosed—self-oiling — high tension mag 'n everything.

REX PUMPS

CHAIN BELT COMPANY
166-7 West Bruce Street
MILWAUKEE WISCONSIN

Name.....

Address.....

City.....

State.....

Get the story on the Water Boy's value, and details on all Rex Pumps and their jobs in the REX PUMP BOOK. Use this coupon.



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Contractors and Engineers Monthly

DIRECTORY OF EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of the various lines handled. Canadian cards appear on pages 149, 150.

ALABAMA—ARKANSAS

C. E. DAVIS ENGINEERING CO.
Brown Marx Bldg. Birmingham, Ala.

Representing

ROBINS—Belt Conveyors and Screens
ALDRICH—Power Driven Pumps
FOSTER-WHEELER—Pulverized Coal Equipment, Superheaters and Condensers
LO-HED—Electric Hoists
INDUSTRIAL BROWNHOIST—Locomotive Cranes
CLEVELAND—Cranes
WILLIAMS—Buckets

LAWRENCE-GOODLING CO., Inc.

Contractors' Equipment

161 North Water St. Mobile, Alabama

Representing

EDWARDS and RYAN Road Machines
CLEVELAND Tractors
HART PARR Tractors
SIDNEY Wheelers, Drags, Plows
RAMSOME Concrete Mixers, Pavers
ORTON Cranes, Shovels, Draglines
AUSTIN Trenching Machines
O. H. & E. Saw Rigs, Hoists, Pumps
FARQUHAR Engines, Boilers, Sawmills

NEIL B. MCGINNIS CO.

753 E. Jackson St. Phoenix, Ariz.

Representing

Allis-Chalmers Monarch Tractors	Jumbo Wheel Scrapers
Brunelle Rippers & Scarifiers	Lima 101 Shovels
Bully Back Fillers & Bulldozers	Madsen Portable Paving Plants
Erie Road Rollers	Master Rotary Scrapers
General Shovels, Cranes, etc.	Milwaukee Gas Locomotives
Gardner-Denver Portable Compressors, Jack Hammers, etc.	Pioneer Crushing, Screening and Loading Plants
Goross Spreaders	Servitized Expansion Joint
Huber Road Rollers	Snow King Rotary Snow Plows
Jasper Concrete Mixers, Pavers, Pumps, Hoists	Williamsport Wire Rope and Aerial Tramways

G. C. PHILLIPS TRACTOR Co., Inc.
1625-31 Ave. B, So. Birmingham, Ala.

Representing

ALLIS-CHALMERS "Monarch" Tractors
AUSTIN Trench Diggers and Backfillers
BAKER "Baker Maney" Self-Loading Scrapers
BYERS Full-Revolving Shovels and Cranes
CHAIN BELT "Rex" Mixers, Pavers, Pumps, Saw Rigs, Etc.
DIXOYL Lubricating Greases
HAISS Loaders and Conveyors
GALION Road Graders and Machinery
PIONEER Screening and Crushing Plants
ROGERS—Heavy-Duty Trailers, 10-100 Tons
TOLEDO Torches
TRACKSON Crawlers, Shovels and Hoists
Member: Associated Equipment Distributors

TURNER SUPPLY COMPANY

N. W. Corner St. Louis & Commerce Sts.
MOBILE ALABAMA

Representing

McKIERNAN-TERRY Corp.—Pile Hammers	DOMESTIC —Pumps and Hoists
INDEPENDENT PNEUMATIC TOOL CO. —"Thor" Tools and Compressors	LAKEWOOD —Subgraders, Finishing Machines, Forms, Chuting Equipment and Towers
WILLIAMS —Clamshell and Dragline Buckets	WYOMING SHOVEL CO. —Red Edge Shovels, Scoops
M & M Form Clamps	LINK-BELT CO. —Crawler Cranes, Shovels, Loaders
ERIE —Bins	WESTERN WHEEL SCRAP-ER CO. —Wheelers, Drags, Scrapers, Fresnoes, Ploughs
JAEGER —Concrete Mixers	BATES —Bar Ties
ORR & SEMBOWER —Concrete Mixers & Hoists	
AMERICAN STEEL & WIRE Co. —"Monitor" Wire Rope	

MINE & SMELTER EQUIPMENT CO.

Construction & Mining Machinery

306-12 South 7th Ave. Phoenix, Ariz.

Representing

NATIONAL Air Compressors
LINK-BELT Shovels, Cranes and Draglines
LAKEWOOD Mixers, Concrete Placing Equip.
CLEVELAND—Rock Drills, Air Tools, etc.
REMMELE Mixers, Small Sizes
NOVO Hoists, Engines and Pumps
LINCOLN Stable Arc Welders and Motors
EDWARDS Wire Rope

SMITH-PITTMAN TRACTOR CO., Inc.

Tractors and Road Machinery

520-26 No. 28th St. Birmingham, Ala.

Representing

"CATERPILLAR"—Tractors and Road Machinery
SPEEDER—Full Revolving Shovels, Draglines
EMPIRE—Cutting Edges, Wheelbarrows, Cars
EUCLED—Crawler Dump Wagons, Power Scrapers
ATLAS—Rotary Wheel-type Scrapers, Fresnoes
JAEGER—Mixers and Pumps
LAKEWOOD—Finishers, Sub-grading Machinery
BLAW-KNOX—"Ball" Wagon Graders

Arizona Tractor & Equipment Co.

238 W. Jefferson St. Phoenix, Ariz.

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Road Machinery
ATHEY Truss Wheels
BUFFALO-SPRINGFIELD Rollers
HEIL Hoists
KILLEFER Road Tools
LaPLANT-CHOATE Snow Plows
LITTLEFORD Asphalt Equipment
SPEEDER Shovels
WILLAMETTE-ERSTED Hoists
EUCLED Earth Moving Equipment

RONSTADT HARDWARE & MACHINERY CO.

"Pioneers in Good Merchandise"

TUCSON, PHOENIX ARIZONA

Representing

GALION Graders, Rollers, etc.
MCCORMICK-DEERING Industrial Tractors, Engines
INTERNATIONAL Motor Trucks
BAKER Earth Moving Equipment
BAY CITY Shovels, Cranes, Draglines
ORD Concrete Finishing Machines
MUNICIPAL Oil Distributors, Finishers, etc.
STERLING Hoists
BRODERICK & BASCOM Yellow Strand Wire Rope
RED EDGE Shovels and Picks
KIMBALL-KROGH Pumps
ALAMO-DORWARD Pumps
MYERS Pumps

The Young & Vann Supply Co.
BIRMINGHAM, ALA.

Koehring Pavers, Mixers, Cranes, Shovels, etc.
Inslay Chutes, Towers, Shovels, Cranes, etc.
Parsons Ditchers, Backfillers
Smith Concrete Mixers and Pavers
Novo Hoists, Pumps
Huber Road Rollers
Blaw-Knox Forms, Batcher Plants, Buckets
Easton Dump Bodies, Cars and Trucks
Worthington Pumps and Air Compressors
Rex-Watson Dump Wagons
Red Edge Shovels and Picks
General Wheelbarrows
M. & M. Form Clamps
Caray Elastite Expansion Joint
Ord Concrete Finishing Machines
Beebe Bros. All Steel Hand Hoists
Metalweld Portable Compressors

**LOOK THIS DIRECTORY
OVER CAREFULLY**

If you find any errors while checking over this directory will you please advise us at once, because it is our desire to keep it accurate and up-to-date at all times.

CONTRACTORS AND ENGINEERS
MONTHLY

470 Fourth Ave. New York

ARKANSAS FOUNDRY COMPANY
IRON AND STEEL

Little Rock Arkansas

Representing

AMERICAN STEEL & WIRE CO.—Wire Rope and Cable
NATIONAL STEEL FABRIC CO.—Wire Mesh
MILWAUKEE CORRUGATING CO.—Lath and Building Products
MAJESTIC CO.—Coal Chutes and Building Products
IRVING IRON WORKS—Subway Grating
CARTER BLOX-ON-END FLOORING CO.—Industrial Wood Flooring
Also
Structural and Reinforcing Steel and Steel Building Products

For Canadian Distributors, see pages 149 and 150

J. B. HARBISON EQUIPMENT CO.

209 Spring St. Little Rock, Ark.

Representing

NORTHWEST Shovels and Drilling
CHICAGO AUTOMATIC Conveyors
RYAN Power Graders and Dual Blade Motor Patrols
WILLIAMS Clamshell and Dragline Buckets
HELTZEL Bins, Weighing Hoppers & Ro. Forms—Curb, Gutter & Sidewalk Forms
GENERAL EXCAVATOR CO. Shovels and Cranes

COAST MACHINERY CORP.

Ed. Crowley, Pres.

931 Santa Fe Ave., Los Angeles, Calif.
310 Fourth St., San Francisco, Calif.

Representing

CLIMAX ENGR. CO.—Industrial Gas Engines
CURTIS PNEUMATIC MACHINERY CO.—Compressors, Hoists, Trolleys
GUSHMAN MOTOR WORKS—Gas Engines
UNIVERSAL MOTOR CO.—Gas Engines
CONCRETE SURF. MACHY. CO.—Concrete surfacers and Finishers. (L. A. Territory)

GARLINGHOUSE BROS.

2044 Santa Fe Ave., Los Angeles, Cal.
Southern California Distributors for

Blaw-Knox Co.—Steel Forms, Road Building Equipment
A. W. French & Co.—ORD Road Finishers
Browning Crane Co.—Shovels, Cranes
Domestic Eng. & Pump Co.—Road Builders and Dewatering Pumps
Ransome—Concrete Placing Equipment
Smith Engineering Works—Crushers and Gravel Plant Equipment
The Knickerbocker Co.—Concrete Mixers, Saw Rigs
Alex. Milburn Co.—Carbide Lights, Cutting and Welding Torches
A. Looschen & Sons Rope Co.—Wire Rope
McKiernan-Try Corp.—Pile Hammers and "National" Hoists
Black & Dyer—Electric Saws and Drills
Member: Associated Equipment Distributors

WE WOULD LIKE TO HAVE YOU HELP US

make this Directory of Dealers in construction equipment the most complete and accurate of its kind. Therefore, we would greatly appreciate any suggestions or corrections that you may have to offer.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Avenue New York

CONCRETE MACHY. & SUPPLY CO.

777 E. Gage Ave. Los Angeles, Calif.

Representing

AMERICAN Cable
ARCHER Towers & Chuting
BUTLER Bins & Batches
BUCYRUS-ERIE Shovels and Cranes
BLYSTONE Products Mixers
CLYDE Hoists & Derrick
GARDNER-DENVER Compressors
HANDY Back Cleaners and Balers
TRACKSON Crawlers, Shovels
Member: Associated Equipment Distributors

B. HAYMAN CO., Inc.

118-128 N. Los Angeles St. Los Angeles, Cal.

Representing

ALLIS-CHALMERS MFG. CO.—Agricultural & Industrial Tractors
BAKER MFG. CO.—Backfillers & Road Equipment
ATLAS SCRAPER CO.—Rotary Wheeled Scrapers & Power Scrapers
W. M. BLAIR MFG. CO.—Hydraulic Loaders & Bulldozers
BROOKVILLE LOCOMOTIVE CO.—Locomotives
HUGHES-KEENAN CO.—Revolving Portable Cranes
RUCKSTELL DISTRIBUTING CO.—Ruckstell Dual High Transmissions
SCHRAMM INC.—Air Compressors
DETROIT HARVESTER CO.—Street Sweepers & Mowing Machines
TRACKSON CO.—Crawler Tractors, Hoists, and Loaders
WEHR CO.—Motor Graders & Pull Graders
WILLAMETTE-ERSTED CO.—Portable Hoists
W-K-M INC.—Oil Field Equipment

KERN—LIMERICK, Inc.

115 No. Spring St. Little Rock, Ark.

Representing

STOCKLAND Graders, Small Road Tools
KOEHRING Pavers, Shovels, Cranes
L. SMITH Mixers and Pavers
INSLEY Mast Hoists, Building Towers
PARSONS Excavators and Backfillers
C. H. & E. Pumps, Saw Taps and Hoists
CLEVELAND Rock Drills, Air Tools, Etc.
RESILIFLEX Guard Rail
ELLICOTT Dredges and Dredging Machinery

HUBER Road Rollers
CEDAR RAPIDS Crushers, and Gravel Plants
SIDNEY Steel Scrapers, Wheelbarrows, Tools
SCHRAMM Air Compressors, Drills, Tools, Etc.
WICKWIRE-SPENCER Wire Mesh and Cable
CONNEAUT Hand Shovels, Cutting Edges for all makes of Graders
MONARCH Tractors
LITTLEFORD Asphalt Heaters
TRACKSON Crawlers, Hoists

CROOK COMPANY

1220 South Grand Ave. Los Angeles, Calif.

Southern California Distributors

Allis Chalmers — Monarch Tractors
Rome Manufacturing Co. — Graders
Master Equipment Co. — Scrapers, Backfillers
Davis Manufacturing Co. — Hydraulic Scraper
Brennels Company — Scarifiers, Road Rippers, Implements
Osgood Company — Shovels, Cranes, Hoes
Buffalo-Springfield Co. — Rollers
Ransome Concrete Machy. Co. — Pavers, Mixers, Towers
W. R. Meadows Company — Expansion Joints
Heltzel Steel & Iron Co. — Bins, Batches, Road Forms
Novo Engine Company — Engines, Hoists, Pumps

SHEPHERD TRACTOR AND EQUIPMENT COMPANY

514-20 West 12th St. Los Angeles, Calif.

Representing

"CATERPILLAR" Tractors
"CATERPILLAR" Road Graders
KILLEFER Scrapers, Scarifiers, Road Discs
ATECO Dirt Movers, Bulldozers
ATHEY Truss Wheel Trainers
BAKER MANEY Scrapers
LaPLANT-CHOATE Crawler Wagons
MASTER Backfillers, Pipe Line Equipment

JOE LYONS MACHINERY CO.

Contractors' Equipment and Supplies

112 Louisiana St. Little Rock, Ark.

Representing

REX—Mixers and Pavers, Mortar and Plaster Mixers, Pumps and Saw Rigs
BLAW-KNOX—Curb, Gutter and Road Forms, Batches, Bins, Clamshell Buckets, Trunk Turntables
RED STAR—Wheelbarrows, Concrete Carts
SKELTON—Shovels
BUCYRUS-ERIE—Power Shovels, Cranes and Draglines
LIDGERWOOD—Hoists, Derrick
NOVO Hoists, Etc.
MORROW—Gravel Screening and Washing Plants
INGERSOLL RAND—Compressors, Drills, etc.
TRU-LAY—Wire Rope
WAUKESHA—FULLER & JOHNSON—LEROI—Engines
BATES—Bar Ties

Also anything else a contractor uses

E. I. CROOK COMPANY

1222 So. Grand Ave., Los Angeles, Cal.

Representing

GENERAL—Shovel, Cranes, Draglines

MORTON—Scrapers, Dirt Movers

D-A Lubricants

SMITH BOOTH USHER CO.

Los Angeles

1910 Santa Fe Ave. 228-238 Central Ave.

BARBER-GREENE—Ditchers, Excavators, Loaders
CARBIC—Portable Lights
CEDAR RAPIDS—Crushing Plants
EASTON—Industrial Cars
FREEMAN—Turntables
GALION—Graders, Rollers
HERCULES—Power Units
JAEGER—Mixers, Hoists, Pumps, Tower Equipment
JOHNSON—Bins, Four Wheel Drive Trucks
LAKEWOOD—Road Finishers, Forms, Chuting, etc.
Member: Associated Equipment Distributors

LE ROI—Gasoline Engines
METALWELD—Compressors
MOHAWK—Asphalt Heaters
MacWHITE—Wire Rope
MULTI-FOOTE—Pavers
MUNDY—Hoists
INDIANA—Hand Shovels
SAUERMAN—Cableway Excavators, Power Drag Scrapers
SIMPLEX—Trench Braces
JACKSON—Wheelbarrows
THEW—Shovels and Cranes
UNIVERSAL—"35" Shovels and Cranes
SKILSAW—Portable Electric Saws

The BROWN-BEVIS CO.

49th St. & Santa Fe Ave. Los Angeles, Cal.

Distributors

J. D. Adams and Co.—Adams Leaning Wheel Graders
Sullivan Machy. Co.—Compressors, Hoists
Wood Shovel & Tool Co.—Wood Molybdenum Shovels
Milwaukee Locomotive Works—Gasoline Locomotives
Continental Motors Corp.—Gasoline Engines
Geo. Halsey Mfg. Co.—Truckloaders and Conveyors
Barnes Mfg. Co.—Barnes Pumps
The Owen Bucket Co.—Clam Shell Buckets
Buckeye Traction Ditcher Co.—Curo & Trench Ditchers
Northwest Engr. Co.—Shovels, Cranes, Draglines
Construction Machy. Co.—Wonder and Marsh-Capron Cement Mixers
Huber Mfg. Co.—Road Rollers
Page Engineering Co.—Dragline Buckets
Littleford Bros.—Tar and Asphalt Heaters, etc.
Member: Associated Equipment Distributors

WE DO NOT CHOOSE TO RUN—

anything in this Directory that is not accurate and up-to-date. Therefore, if you find any errors or corrections we hope you will let us know about them. Thank you.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

OWEN BUCKET CO., Ltd.

2857 Hannah Street Oakland, Calif.

Representing

THE OWEN BUCKET CO.
Clamshell Buckets

DRAKE, WILLIAMS, MOUNT CO.
Dragline Buckets

CORNELL TRACTOR COMPANY

10 Abbott St., Salinas, Calif.

Branches:
Watsonville Soledad King City

Distributors:
"Caterpillar" Tractors
"Caterpillar" Combines
"Caterpillar" Graders
John Deere Implements
Killefer Manufacturing Corporation
Farm Implements & Road Machinery
"ATECO" Road Machinery
Bus Trucks

EDWARD R. BACON CO.

CONSTRUCTION EQUIPMENT

Folsom at 17th St. San Francisco

Adams Leaning Wheel Graders
Burch Stone Spreaders
Byers Shovels and Cranes
Carr Subgraders
Cedar Rapids Crushers
Cleveland Trenchers
Easton Industrial Cars
Hercules Power Units
Homelite Pumps
Huber Rollers
Jaeger Concrete Mixers
Johnson Bins and Batchers
Member: Associated Equipment Distributors

Madsen Asphalt Plants
McCormick-Deering Industrial Tractors
McKiernan-Terry Pile Hammers
MultiFoot Road Pavers
Northern Conveyors
Ord Road Finishers
Schramm Air Compressors
Templeton Kinky Jacks and Trench Braces
Toledo Torches and Hoses
Trackcon Crawler Tractors

NORRIS K. DAVIS, INC.

400 Seventh St. San Francisco, Calif.

Representing
LE ROI CO.—Gasoline Power Units
MINNEAPOLIS STL. & MACHY. CO.—Twin City Engines
ARCHER IRON WORKS—Concrete Placing Equipment
CLEVELAND WHEELBARROW CO.—"Red Star" Wheelbarrows
RUSSEL SHOVEL CO.—Hand Shovels
DAVIS CO.—Mixers, Hoists, Motor Truck Concrete Transfer Systems

GARFIELD & CO.

Construction Equipment
Hearst Building San Francisco, Calif.

Representing
PLYMOUTH—Gasoline and Diesel Locomotives
LINK-BELT—Shovels, Draglines and Cranes
AUSTIN—Trenchers and Backfillers
BAY CITY—Shovels, Cranes, Draglines and Cranes
CLYDE—Hoists and Derricks
INSLEY—Chuting Plants for Dams
LEACH—Mixers, Pavers, Saw Rigs
ERIE—Buckets and Aggregators
ROLLER-BEAR—Rock Crushers

JENISON MACHINERY CO.

58 Fremont St., San Francisco, Calif.

Representing
Barber-Greene Co.
Butler Bin Co.
Carbie Mfg. Co.
Carter Humdingler Pumps
Chicago Pump Co.
Continental Motors Corp.
The Elgin Corporation
Gallen Iron Wks. & Mfg. Co.
Hercules Corporation
Lakewood Engineering Co.

McCloskey Torch Co.
Morris Machine Works
J. S. Mundy Htg. Engine Co.
Orion Crane & Shovel Co.
Sauerman Bros., Inc.
Smith Engr. Works
Sterling Pump Works
Thew Shovel Co.
Watt Car & Wheel Co.
Wilson Welder & Metals Co.

Member: Associated Equipment Distributors

KRATZ & McCLELLAND, Inc.

522 Bryant St. San Francisco, Calif.

Northern California Distributors
Rarog Concrete Machy. Co.—Pavers, Mixers, Towers, Chuting
Novo Engine Co.—Engines, Hoists, Pumps, Lighting Units
Chausse Oil Burner Co.—Portable Asphalt Plants, Kettles, Surface Heaters
Grayhound—Contractors Portable Saws
Milwaukee Locomotive Co.—Gasoline Locomotives
Diamond Iron Works, Inc.—Gravel & Rock Crushing Plants
G. H. Williams Co.—Clam Shell & Drag Line Buckets and Heavy-Duty Trailers
Holtzel Steel Form & Iron Co.—Bins, Batchers & Road Forms
Union Iron Works, Inc.—Pile Hammers & Foundation Equip.
Bartlett & Snow—Concrete Truck Bodies
Graham Ditcher Co.—Ditchers and Trench Supporters
Fischer & Hayes Rope & Steel Co.—Concrete Form Devices
N. P. Nelson Iron Works—Loaders & Conveying Equipment

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CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

ELTON T. FAIR CO.

1611 Wazee St. Denver, Colo.

Representing
J. D. Adams Co.
Pioneer Gravel Equip. Mfg. Co.
D-A Lubricant Co., Inc.

JOHN W. FINK COMPANY

1645 Wazee Street Denver, Colo.

Representing
ROME MFG. CO.—Graders
DUPLEX MFG. CO.—Road Maintainers
SPEEDER MACHY. CO.—Gas Shovels, Cranes, Draglines, Skimmers
HUBER MFG. CO.—Gas Rollers
DAVIS MFG. CO.—Land Levelers

Chapman & Fitzgerald
INDUSTRIAL & CONSTRUCTION EQUIPMENT

U. S. National Bank Building, Denver, Colo.

P. H. Shovels, Cranes, Draglines, Trench Machines
NORTHERN Portable and Stationary Conveyors
PLYMOUTH Gasoline and Diesel Locomotives
ARCHER Steel Tower & Concrete Distributing Systems
OWEN Clamshell Buckets

OHIO Locomotive Cranes
ERIE Aggregator Plants
McKiernan-Terry Pile Hammers
GRUENDLER Crushing and Screening Plants
HIGHWAY 3-4-5 Wheel Trailers
PAGE Dragline Buckets

Hendrie & Bolthoff Mfg. & Supply Co.

Established 1861

1635 Seventeenth St. Denver, Colo.

Representing
AMERICAN—Contractors Saw Tables
AMERICAN—Hoists and Derricks
BARBER ASPHALT CO.—Roofing and Asphalt Products
BEEBE BROS.—Hand Winches
BOSS—Concrete Mixers
CLIMAX—Gasoline Power Units
GARDNER-DENVER—Pumps, Air Compressors and Drills
GENERAL ELECTRIC—Motors and Appliances
NOVO—Engines and Hoists
ROEBLING—Rope and Wire
SKILSAW CORP.—Skilaws
UNIVERSAL—Crushers
WYOMING—"Red Edge" Shovels

H. W. MOORE EQUIPMENT CO.

6th & Acme Streets Denver, Colorado

Representing
BATES Tractors
BUTLER Bins
GALION Graders, etc.
JAEGER Concrete Mixers
GENERAL EXCAVATOR Shovels, Cranes, Etc.
STROUD Elevating Graders
BAKER Maintainers, Plovers
ETNYRE Sprinklers & Oilers
LAKEWOOD Concrete Handling Equipment
WHITCOMB Locomotives
WEHR One-Man Graders
CHAUSS Asphalt Heaters
TRACKSON Crawlers

SASGEN Derricks
INTERNATIONAL Tractors
SIDNEY Scrapers and Wheelbarrows
UNIVERSAL Cranes
ERSTED Hoists
THEW Shovels
SCHRAMM Compressors
CLEVELAND Rock Drills
HOMELITE Pumps
CEDAR RAPIDS "Pre-Mix" Oil Plants, Crushers, Etc.
TRAILMOBILE Trailers
HUGHES - KEENAN Iron Mules

Member: Associated Equipment Distributors

HERBERT N. STEINBARGER CO.

Construction Equipment
1640-1646 Wazee St. Denver, Colo.

Distributors
BUCHYRUS-ERIE Steam, Gas, Diesel and Electric Shovels, Draglines and Cranes
VULCAN Steam and Gasoline Locomotives
BUTLER Bins and Hoppers
SAUERMAN Power Scrapers, Cableway Excavators
AUSTIN Trenching Machines, Backfillers
METAFORM Sidewalk, Curb and Road Forms
KNICKERBOCKER Concrete Mixers
MUL-FOOTE Paving Mixers
WILLIAMS Buckets
BUFFALO-SPRINGFIELD Steam and Gasoline Rollers
RYAN-EDWARDS Road Machinery
BUHL Portable Compressors
HARDSOQ Drills and Pavement Breakers

Member: Associated Equipment Distributors

SPROTT TRACTOR & EQUIP. CO.

150 W. Main St., Grand Junction, Colo.

Representing
Caterpillar Tractor Co.
Killefer Mfg. Co.
LaPlant-Choate Mfg. Co.
Williamette-Ersted Co.
Oliver Farm Equip. Sales. Co.
Athey Truss Wheel Co.
Lansing Mfg. Co.
W-K-M Co., Inc.

THE HOLMES-TALCOTT CO.

HARTFORD, CONNECTICUT
SPRINGFIELD, MASSACHUSETTS

Representing
SPEEDER—Shovels and Cranes
LEACH—Concrete and Plaster Mixers, Mast Hoists and Saw Rigs
METALWELD-WORTHINGTON—Portable Air Compressors
CLEVELAND—Rock Drills
ERIE—Aggregators, Bins and Buckets
METAFORM—Steel Road Forms
HAISS—Loaders and Conveyors
AUSTIN-WESTERN—Road Machinery
CLYDE Hoists
HIGHWAY—Trailers
BEAUMONT—Slackline Cableway and Drag Scraper Systems

Equipment for Contractors

The K. B. NOBLE CO.O
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REPRESENTING AMONG OTHERS

Rea Mixers Hercules Engines
Heltzel Bins & Batches Left Engines
Lawrence Pumps Smith Crushers, etc.
Saugen Derricks Easton Cars, etc.
Sullivan Compressors Garst Scrapers
Box Hoists Owen Buckets
National Hoists Byars Shovels
Link-Belt Loaders Cranes, Conveyors

Member:

Associated Equipment Distributors

HARTFORD, CONNECTICUT

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S**JULIEN P. BENJAMIN INC.**

21 N. Ocean St. Jacksonville, Fla.

Representing

McKiernan-Terry Corporation
Barber-Greene Co.
Aerofil Burner Co.
Sauerman Bros., Inc.
Link Belt Co.
Heltzel Steel Form & Iron Co.
Standard Conveyor Co.
Dixoy, Incorporated
National Colortype Co.
Huber Rollers
Climax Engineering Co.
National Hoisting Engines
Bay City Cranes

LLEWELLYN MACHINERY CORP.

Miami Representing Florida

American Saw Mill Machy. Co.
Archer Iron Works
Atlas Imperial Diesel Eng. Co.
Barber-Greene Co.
Blystone Mfg. Co.
Chicago Pneumatic Tool Co.
Cleveland Tractor Co.
Consolidated Const. Mch. Co.
Denver Rock Drill Mfg. Co.
Electric Welding Co.
Engberg's Elec. and Mech.
anial Works
Erie Steel Constr. Co.
Foots Co.—Pavers
Hercules Corp.
Independent Pneu. Tool Co.
Jaeger Machine Co.
Jeffrey Mfg. Co.
Wm. H. Keller, Inc.
Mathews Conveyor Co.
Metal Form Corp.
Northwest Eng. Co.
Novo Engine Co.
Page Engineering Co.
Phoenix Mfg. Co.
Oliver Farm Equip. Sales Co.
Rochester Can Co.
Rumsey Pump Co.
Saugen Derrick Co.
Schramm, Inc.
Worthington Pump & Machinery Co.

THE GESNER EQUIPMENT CORP.

254 Park St. New Haven, Conn.

Representing

Jaeger Machine Co.
Northern Conveyor & Mfg. Co.
Domestic Engine & Pump Co.
De Walt Products Co.
Schramm, Inc.
Cleveland Rock Drill Co.
Marion Steam Shovel Co.
Beaumont Mfg. Co.
Universal Road Machinery Co.

FARQUHAR MACHINERY CO.Mill Supplies and Machinery
720 W. Bay Street Jacksonville, Fla.

Representing

AMERICAN
ARCHER
CARBIC
CRESCENT
FARQUHAR
GOULDS
JACKSON
LINK-BELT
NOVO
NOVO
NOVO
SASGEN
SILVERSTRAND
TOLEDO
STRUCTURAL STEEL
"BOSS" Concrete Mixers
Concrete Tower Equipment
Flare Lights, Welding Equipment
Saw Tables and Woodworkers
Engines and Boilers
Power Pumps
Wheelbarrows, Concrete Carts
Chains, Sprockets, Drives
Gasoline Engines
Hoists, Single and Double Drum
Power Diaphragm & Road Pumps
Derrick Equipment
Wire Rope and Accessories
Steel Torch Lights
Plain and Fabricated

D. E. FISHBACK

ORLANDO DISTRIBUTOR FLORIDA

Fairbanks-Morse & Co., Oil Engines, Pumping Machinery
Electric Motors, Home Light and Water Plants
Jaeger Machine Co. Concrete Mixers, Road and Trench
Pumps, Hoists, Etc.
Cincinnati Rubber Co., Dredging Slivers, Suction and
Discharge Hose
American Saw Mill Mach. Co., Portable Woodworkers,
Saw Benches, etc.
Gould's Pumps, Inc., Power, Diaphragm and Hand Pumps
Cement Block Mach. Co., "National" Concrete Block
Machines
Chicago Pneumatic Tool Co., Portable and Stationary Air
Compressors, Lift Pumps, Pipe, Valves and Fittings
STOCK CARRIED IN ORLANDO

Power Equipment & Service Inc.

109 Water Street New Haven, Conn.

CONN. DISTRIBUTORS

COLDWELL Power Mowers
RODERICK LEAN Scrapers
GALION Road Machinery
OLIVER Implements
SARGENT and WALSH Snow Plows
CLETRAC Crawler Tractors
HART-PARR Tractors
MARLO Pumps

M. D. MOODYACL No. 2—Sect. 1. Riverside Viaduct
Jacksonville, Florida

Representing

J. D. Adam & Co.
American Casting Co.
American Mfg. Co.
American Tar Products Co.
Buffalo-Springfield Roller Co.
Cyclone Fence Co.
The Elgin Corporation
E. D. Etnyre & Co.
De Walt Products Co.
Chas. Hyatt Co.
Littleford Brothers
Lakewood Engineering Co.
Mead-Morrison Mfg. Co.
Rawls Mfg. Co.
Frushauf Trailer Co.
Freeman Mfg. Co.
Domestic Engine & Pump Co.

McDONALD TRACTOR EQUIP. CO.

2303 N. Orange Ave. Orlando, Fla.

Representing

Caterpillar Tractor Co.
"Caterpillar" Graders
Athy Truss Wheel Co.
Barnes Manufacturing Co.
Blaw-Knox Company
P & H Cranes
LaPlant-Choate Mfg. Co.
Chain Belt Co.
Fate-Roth-Heath Co.
Fuller & Johnson Mfg. Co.
Killefer Manufacturing Corp.
Le Roi Company
Goulds Pumps, Inc.
Stover Engines
Century Motors
Members: Associated Equipment Distributors

Hudson Supply & Equipment Co.

7th & T Sts., NE. Washington, D. C.

Representing

HELTZEL STEEL FORM & IRON CO.—Road
Forms, Curb and Gutter Forms, Bins,
Batches
N. F. NELSON IRON WORKS, INC.—Loaders
CONCRETE SURFACING MACHINERY CO.—
"Berg" Concrete Surfacers
CHAIN BELT CO.—Mixers, Hoists, Pumps
SASGEN DERRICK CO.—Derricks, Winches
NOVO ENGINE CO.—Hoists, Pumps, Engines
NATIONAL BRAKE & ELECTRIC CO.—Air
Compressors

Member: Associated Equipment Distributors

CONTRACTORS EQUIPMENT CO.

2150 N. W. 1st Court Miami, Fla.

Representing

INGERSOLL-RAND Compressors
REX Mixers, Pavers, Chain
BLAW-KNOX Steel Forms, Batches
JONES-SUPERIOR Super Woodworkers
LANSING Hoists
BARNES Pumps
ORD Concrete Road Finishers
STREET BROS. Hoist and Derrick Fittings
SYNTEON Electric Hammers
NORTHERN Conveyors
LE ROI Engines
ESSICK Plaster Mixers

Miscellaneous Contractors' Supplies

J. L. HART MACHINERY CO.

407 Eunie Ave. Tampa, Fla.

Representing

NATIONAL EQUIPMENT CORP.
Inley Mfg. Co.
Koehring Company
C. H. & E. Mfg. Co.
American Mfg. Co.
Blaw-Knox Company
Broderick & Bazoom Rope Co.
Cleveland Rock Drill Co.
Kohler Co.
The Parsons Co.
T. L. Smith Co.
Kelik-Mix Co.
Morris Machine Works
Morso-Starratt Products Co.
Schramm, Inc.
Toledo Pressed Steel Co.

THE HENRY H. MEYER CO.

1114-9th St., N. W., Washington, D. C.

110 S. Howard St., Baltimore, Md.

Representing

Austin Machinery Co.
Blaw-Knox Co.
Boston & Lookport Block Co.
Brookville Locomotive Co.
Byers Machine Co.
Chausse Oil Burner Co.
Connery & Co., Inc.
Domestic Engine & Pump Co.
E. I. Du Pont de Nemours &
Co.
Dobbin's Fdy. & Machine Co.
Duff Mfg. Co.
Harrington Co.
Lambert Hoisting Engine Co.
A. Leeshen & Sons Rope Co.
Pulsmeter Steam Pump Co.
Ransome Concrete Mach. Co.
Richmond Screw Anchor Co.
Sterling Wheelbarrow Co.
Templeton-Kenly Co., Ltd.
Toledo Pressed Steel Co.
Union Iron Works
Universal Road Machy. Co.

GENERAL EQUIPMENT MACHINERY CO., Inc.

P. O. Box 1454 Miami, Fla.

Representing

Acme Road Machy. Co.
Buller Bin Co.
Clyde Iron Works
Domestic Engine & Pump Co.
Good Roads Machinery Co.
Halsey Geo. Mfg. Co.
Ideal Power Lawn Mower Co.
Inley Mfg. Co.
Koehring Co.
Lakewood Engr. Co.
Macarhyte Co.
McLushan-Stone Machines
National Brake & Electric Co.
National Equip. Corp.
Parsons Co.
Patent Scaffold Co.
Ridell Co. W. A.
Ryan Mfg. Corp.
Saugen Derrick Co.
Smith Engr. Works
Smith T. L. Co.
Sterling Wheelbarrow Co.
Toledo Pressed Steel Co.
Wyoming Shovel Works
Yale & Towne Mfg. Co.

YANCEY TRACTOR COMPANY

109-115 Booker Ave. Albany, Ga.

Representing

"CATERPILLAR" Tractors
and Road Machinery
ATHEY Trum Wheel
BAKER-MANNEY Wheelers
WATSON Dump Wagons
KILLEFER Road Rippers,
Rotary Scrapers
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Representing
 ACME Road Graders, Rollers, Etc.
 BROWNING Cranes
 BURY Stationary Air Compressors
 CLIMAX Engines
 DEAN BROS. Pumps
 DEAN HILL Centrifugal Pumps, Turbines
 FLORY Hoists
 GENERAL ELECTRIC Air Welders, Motors
 INGERSOLL-RAND Air Compressors, Tools
 INTERNATIONAL Nickel, Manganese
 KOPPEL Industrial Cars
 LAKEWOOD Mixers, Towers
 MERRELL Pipe Machines
 MORRIS Dredge Pumps
 NORTHERN Cranes
 NOVO Engines, Hoists and Pumps
 NAGLE Boilers
 PACIFIC Deep Well Pumps
 PLYMOUTH Locomotives
 STEPHENS-ADAMSON Conveyors, Etc.
 WEBER Insulating Cement
 WEIR-KILBY Pumps and Switches
 Welded Tanks, Pipe, Etc.

SOUTHERN STATES EQUIP. CO., Inc.
1510-1530 Tchoupitoulas St. NEW ORLEANS

Representing
 B & H—Shovels, Cranes and Draglines
 BLAW-KNOX—Bins, Batchers, Road Forms, Buckets
 ORD—Concrete Finishing Machines
 FOOTE—Paving Mixers
 JAEGER—Concrete Mixers
 TELSMITH—Sand and Gravel Plants
 DOMESTIC—Pumps, Engines
 ORR & SEMBOWER—Hoisting Engines
 LAKEWOOD—Concrete Chuting
 UNION—Pile Hammers
 THOR—Compressors and Air Tools
 KOPPEL—Industrial Cars and Trucks
 STANDARD—Heating Kettles
 CONTINENTAL—Gas Engines
 CHICAGO—Automatic Material Conveyors

MAINE ROAD EQUIPMENT CO.

Congress Bldg. Portland, Me.

Representing
 Four-Wheel Drive Auto Co.
 Universal Power Shovel Co.
 Rome Manufacturing Co.
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 Owen Bucket Co.
 M. P. Nelson Iron Works
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New Orleans Louisiana

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 Babcock & Wilcox Co.
 Babcock & Wilcox Tube Co.
 Cleveland Worm & Gear Co.
 Robins Conveying Belt Co.

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Representing
 ST. MARY'S Diesel Oil Engines
 HILL Diesel Oil Engines
 ALAMO Gasoline Engines
 O. K. Hoists
 LANSING Concrete Mixers
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 MYERS Pumps
 KELLOGG Air Compressors
 STERLING Deep Well Turbines
 METALASTIC Packing
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 "CATERPILLAR" ROAD MACHINERY
 "CATERPILLAR" COMBINE HARVESTERS
 GENERAL EXCAVATORS
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 LINK-BELT SHOVELS & CRANES
 EUCLID CRANE & HOIST CO.
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 WILLAMETTE-ERSTED CO.
 BAKER MANUFACTURING CO.
 ROTARY SNOW PLOW CO.
 ATHEY TRUSS WHEEL CO.
 REX-WATSON CORPORATION
 FRANK SNOW PLOW CO.
 DAVEY AIR COMPRESSOR CO.

Louisiana Tractor & Equipment Co.Formerly LOUISIANA ROAD MACHY. CO.
1111 Julia Street New Orleans, La.

Representing
 ATHEY TRUSS WHEEL CO.—Wagon Trailers, Wheels
 KILLEFER MFG. CORP.—Drag Scrapers, Road Scarifiers
 LA PLANT-CHOATE MFG. CO.—Steel Dump Wagon, Trailers
 BUFFALO-SPRINGFIELD ROLLER CO.—Road Rollers
 SPEEDER MACHINERY CORP.—Auto-Cranes, Draglines
 EAGLE WAGON WORKS—Dump Wagon
 ELGIN CORP.—Street Sweepers and Educators
 UNIVERSAL ROCK CRUSHER CO.—Crushers

WORMINGTON & POWERS, Inc.

601 Southern Bldg. New Orleans, La.

Representing
 LITTLEFORD BROS. CO.—Tar & Asphalt Heaters, Road Builders' Supplies
 THE KNICKERBOCKER CO.—Concrete & Mortar Mixers, Saw Rigs
 OSGOOD CO.—Steam, Gas, Electric Cranes, Shovels, Draglines, etc.
 W. A. RIDDELL CO.—Road Building Machinery
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 MUNDIE MFG. CO.—Gas & Electric Air Compressors
 METAL FORMS CORP.—Building, Gutter, Curbs, Sidewalk & Road Forms
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 INSLEY MFG. CO.
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 SAUERMAN BROS., INC.
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325 N. Cortez St. New Orleans

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 McKernan-Terry Corp.
 American Cement Mach. Co.
 American Saw Mill Machinery Co.
 Schramm, Inc.
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 Debbie Derricks
 Wyoming Shovel Works
 Waukena Motor Co.
 Erie Blue & Bartens
 Patent Scaffolding Co.
 Universal Form Clamp Co.
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 Cleveland Wheelbarrow Co.
 H. W. Ross Co.
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Member: Associated Equipment Distributors

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Representing
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 Bay City Shovels, Inc.
 Brookville Locomotive Co.
 Erie—Rollers
 Garst—Drag Scrapers
 Lightning—Sand & Gravel Pumps
 Schramm Incorporated
 Smith-Engineering Works
 Pumps—For All Purposes

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 The Lakewood Engineering Co.
 Consolidated Concrete Machinery Corp.
 National Hoisting Engine Company
 American Cable Company
 The Browning Crane Co.
 Butler Bin Company
 National Brake & Electric Co.
 Wheeling Corrugating Company
 Good Roads Machinery Company
 Littleford Brothers
 The Foote Company
 Hotchkiss Steel Products Company
 Jones Superior Machine Co.
 The Burch Corporation
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 GEO. HAISS MFG. CO.
 RUMSEY PUMP CO.
 AMERICAN Steel & Wire
 FAIRBANKS Wheelbarrows
 SIMPLEX Jacks & Trench Braces
 HANDY Hack Blades
 COLUMBIA Manila Rope
 GALION Graders and Road Machinery
 WRIGHT Hoists
 MIAMI-CLETRAC Scrapers
 HAUCK MFG. CO.
 Reinforcing Steel
 JOHNS-MANVILLE
 Brake Lining
 DOBBIE Derricks, Winches

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 BARBER-GREENE CO.
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 SARGENT SNOW PLOWS
 MARION STEAM SHOVEL CO.
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 Brookville Locomotive Co.
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 Dobbie Fdy. & Machine Co.
 Duff-Norton Mfg. Co.
 Harrington Co.
 Lambert Hoisting Engine Co.
 A. Leech & Sons Rope Co.
 Pulsometer Steam Pump Co.
 Ransome Concrete Mach. Co.
 Richmond Screw Anchor Co.
 Sterling Wheelbarrow Co.
 Templeton-Kenly Co., Ltd.
 Toledo Pressed Steel Co.
 Union Iron Works
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Wyoming Shovel Works
Sterling Wheelbarrow Co.
John A. Roebblings' Sons Co.
Crane Co.
National Tube Co.
International Motor Trucks
Goodyear Tire & Rubber Co.
Manhole Frames, Covers & Drain Gates

HEDGE & MATTHEIS COMPANY

285 Dorchester Ave. Boston, Mass.
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Representing

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Austin Machinery Corp. LeRoi Company
Butler Bin Co. A. Leach & Sons Rope Co.
Blystone Manufacturing Co. Littleford Bros.
Cleveland Wheelbarrow & McGowan-Terry Corp.
Mfg. Co. Mack-Morrison Mfg. Co.
Easton Car & Construction Co. Miller Mfg. Co.
Hercules Motors Corp. Sagen Derrick Co.
Homelite Corporation The Ohio Power Shovel Co.
Ingersoll-Rand Co. Toledo Pressed Steel Co.
Jaeger Machine Co. Universal Power Shovel Co.
Lakeside Engineering Co. Wood Shovel & Tool Co.
Dobbie Foundry & Machine Co. G. H. Williams Co.

Member: Associated Equipment Distributors

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J. D. Adams Co.—Motor Graders, Tractor Graders, Road Drags
Auroil Burner Co.—Asphalt "Smokeloom" Heaters
Oliver Ames & Sons—Shovels, Scoops
Barnes Mfg. Co.—Pumps
Baker Mfg. Co.—Truck and Tractor Snowplows
Burch Corp.—Spreaders and Unloaders
Gillon Bros.—Concrete Mixers
Chas. Hyatt & Co.—Sweepers, Brooms, Sprinklers, Trailers,
Asphalt Plants and Sand Spreaders
Jesse Mfg. Co.—Gravel Reduction Plants, Crushers
J. P. Healey Co.—Catch Basin Cleaners
Illinois Wire & Mfg. Co.—Snow Fences
Klein-Logan Co.—Ficks, Hammers, Crow Bars
Monarch Tractor Co.—Tractors
Rex-Watson Corp.—Wagons, Trailers
Western Crucible Steel Casting Co.—Shovel Teeth
Wilson Bros.—Multi-Foot Pavers

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Harold L. Bond, Pres.

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KOEHRING—Cranes, Shovels and Mixers JONES-SUPERIOR—Work
PARSONS—Trench Machines and Backfillers SASGEN—Derricks
INSLEY—Excavators and JOHNSON Bins and Batches
Concrete Placing Equip. NOVO—Gasoline Engines,
CHICAGO—Auto. Conveyors Pumps and Hoists
ROGERS—Trailers INGERSOLL-RAND—Air Compressors

Member: Associated Equipment Distributors

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376 Dorchester Ave. Boston, Mass.

Representing

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Tractors EYERS—Cranes and
"CATERPILLAR" Shovels
Graders REX—Mixers, Pavers
WAUSAU—Plows MUNDY—Hoists
LAPLANT-CHOATE OWEN—Buckets
Bulldozers SCHRAMM—Air Compressors
REX—Pumps

H. F. DAVIS TRACTOR CO., Inc.

59 Montgomery Ave. Holyoke, Mass.

Representing

Cletrac Tractors
Walsh Snow Plows
Automatic Scrapers
Bulldozers
Road Plows
Saw Rigs

CLARK-WILCOX COMPANY

790-798 Albany St. Boston, Mass.

Representing

RANSOME—Concrete Mixers, Chuting Equip.
NORTHWEST—Cranes, Shovels, Draglines
TRUCKTOE—Crawler Trucks
BLAW-KNOX—Steel Forms, Bins, Buckets
ORD—Concrete Road Finishers
HUBER—Road Rollers
CARTER—"Humdinger" Pumps
INGERSOLL-RAND—Air Compressors
ORB-SEMBOWER—Hoists, Boilers, Mixers
ROOS—Shores and Clamps
HAUCK—Oil Burners and Heaters

RAPP-HUCKINS COMPANY, Inc.

Established 1900

138-148 Beverly Street

North Station Industrial Bldg.

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Climax "Trustworthy" Engines
Twin Disc Clutches
Buda Engines
Gasoline and Oil Engines
Telephone Capital 1322-1323

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LEACH—Concrete and Plaster Mixers, Mast
Hoists and Saw Rigs
METALWELD-WORTHINGTON—Portable Air
Compressors
CLEVELAND—Rock Drills
ERIE—Aggregators, Bins and Buckets
METAFORM—Steel Road Forms
HAISS—Loaders and Conveyors
AUSTIN-WESTERN—Road Machinery
CLYDE—Hoists CARTER—Pumps
HIGHWAY—Trailers
BEAUMONT—Blackline Cableway and Drag
Scraper Systems

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141 Milk St. Boston, Mass.

Representing

LEACH CO.—Concrete Mixers, Mast Hoists
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HELTTEL STEEL FORM & IRON CO.—Steel
Forms, Bins and Batches
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Block Machines
ATLAS ENGINEERING CO.—Conveyors
PIONEER GRAVEL EQUIP. MFG. CO.—
Screening, Crushing and Loading Ma-
chinery

WE DO NOT CHOOSE TO RUN—

anything in this Directory that is not accurate and up-to-date. Therefore, if you find any errors or corrections we hope you will let us know about them. Thank you.

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave. New York

M. B. TYLER COMPANY

344 Columbus Ave., Springfield, Mass.

Representing

"CATERPILLAR" Tractors, Road Machinery
and Combines (Conn. & Western Mass. Terr.)
KILLEFER Tractor Implements
LA PLANT-CHOATE Trailers and Snow Plows
WILLAMETTE-ERSTED Hoists for "Cater
pillars"
W-K-M Hoists and Rock Crusher for Tractors
DAVIS Air Compressor Attachments for Tractors
FARQUHAR Boilers and Engines
PIONEER Gravel Equipment, Screens, etc.
HI-WAY SERVICE Snow Plows
SPEEDER Gasoline Shovels and Cranes
INGERSOLL-RAND Air Compressors, Tools
EUGLID Scrapers and Wagons
HERCULES Gasoline Rollers

THE EQUIPMENT CO.

23-29 Island St. Boston, Mass.

Representing

LINK-BELT Cranes and Shovels
HAISS Loaders, and Belt Conveyors
INGERSOLL-RAND Compressors and
Tools
CONTINENTAL "Red Seal" Gas En-
gines
LIDGERWOOD Hoists

GEO. H. SAMPSON CO.

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80 Federal St. Boston, Mass.

Telephone, Liberty 7479

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Air Compressors
Jackhammers, Pneumatic Tools, Pumps
ATLAS POWDER CO.—Dynamite
KEYSTONE Concrete Mixers
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NEW ENGLAND IMPLEMENT CO., Inc.

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Tractor Co.
Wehr Company
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Whitehead & Kales Co.
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Sauerman Brothers, Inc.
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Michigan

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Flint—Grand Rapids—Toledo

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Bucher-Gibbs Flow Co.
Ferguson-Sherman, Inc.
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Whitehead & Kals Co.
Detroit Harvester Co.
Stover Mfg. Co.
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Wehr Company
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Stoughton Company

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Gustav Schaefer Co.
U. S. Body & Forging Co.
W. M. Blair Mfg. Co.
Trackson Company
Baker Mfg. Co.
Edison Steel Scraper Co.
Perfection Steel Body Co.
St. Paul Hydraulic Hoist Co.
Kingham Trailer Co.
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HUNTER MACHINERY COMPANY221-241 Waterman Ave., Detroit, Mich.
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CHAINBELT Mixers, Pavers,
Pumps, Saw Rigs, Elevators
NORTHWEST Cranes, Shov-
els and Draglines
BLAW-KNOX Buckets, Bins,
Batchers and Forms
SULLIVAN Air Compressors
HOMELITE Pumps
SAUERMAN Draglines
CLYDE Hoists, Derricks
ORD Finishing Machine
LESCHEN Wire Rope
TRACKSON Crawlers
GOROCO Spreaders
LEROI Engines
Member Associated Equipment Distributors

LONDELIOUS Water Heaters
SASGEN Derricks, Winches
AUSTIN Trenchers and Back-
fillers
TOLEDO Torches & Hoses
McKIERNAN-TERRY Pile
Hammers
INTERNATIONAL HAR-
VESTER Tractors
AEROIL Torches, Heaters
ARCHER Tubular Towers
MORITZ Shouldering Ma-
chines
BATES Wire Ties
Member Associated Equipment Distributors

WALLACE EQUIPMENT COMPANY

Phone: Garfield 3085

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ROOS—Shores and Clamps

UNIVERSAL—Clamps

PATENT—Scaffolds

PLYMOUTH—Locomotives

HELTZEL—Steel Forms

**WILLIAM FORD TRACTOR
SALES COMPANY**

6405 Schaeffer Road Dearborn, Mich.

Flint—Grand Rapids—Toledo

Representing

Ford Motor Company
Bucher-Gibbs Flow Co.
Ferguson-Sherman, Inc.
Roderick-Loss Mfg. Co.
Whitehead & Kals Co.
Detroit Harvester Co.
Stover Mfg. Co.
W. A. Riddell Co.
Wehr Company
Williamette-Ernest Co.
Stoughton Company

Resistor Engr. Corp.
Gustav Schaefer Co.
U. S. Body & Forging Co.
W. M. Blair Mfg. Co.
Trackson Company
Baker Mfg. Co.
Edison Steel Scraper Co.
Perfection Steel Body Co.
St. Paul Hydraulic Hoist Co.
Kingham Trailer Co.
York-Hoover Body Corp.

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5124-70 Braden Avenue

Detroit

Michigan

Distributors of

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LA PLANE-CHOATE Bulldozers, Backfillers, Wagons, Snow-

plows

ATECO Hydraulic Scrapers

BAKER MANEY Road Scrapers, Snowplows

WILLAMETTE Hoist for "Caterpillars"

BUCYRUS-ERIE Shovels, Cranes and Clamshells

WILLIAMS Clamshell and Dragline Buckets

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PARSONS CO.
C. H. & E. MFG. CO.
LIDGERWOOD MFG.
CO.
MACWHYTE CO.
ROME GRADERS
ALLIS-CHALMERS
CO.

C. S. JOHNSON CO.
BAKER MFG. CO.
SCHRAMM, INC.
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STROUD ROAD MA-
CHINERY CO.
FOUR WHEEL DRIVE
TRUCKS
WOOD SHOVEL &
TOOL CO.

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General Excavator Co.
Dobbie Foundry & Machine Co.
Hercules Motors Corp.
J. S. Mundy Hoisting Engine Co.
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Upson-Walton Co.
A. S. Marlow Co.
J. I. Case Co.

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Erie—Steel Bins, Aggregators and Buckets
Goodall—Hoes, Boots and Slickers
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Ingersoll-Rand—Compressors, Air Tools
Knickerbocker—Concrete Mixers, Saw Rigs
Lacawana—Steel Sheet Piling
National—Hoisting Engines and Winches
Sasgen—Derricks and Winches
Thew—Shovels, Cranes and Draglines
Union—Pile Hammers, Mixers, Air Locks
Wickwire-Spencer—Wire Rope, Blocks, etc.
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Member: Associated Equipment Distributors

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Pumps, Saw Rigs, Elevators
NORTHWEST Cranes, Shov-
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BLAW-KNOX Buckets, Bins,
Batchers and Forms
SULLIVAN Air Compressors
HOMELITE Pumps
SAUERMAN Draglines
CLYDE Hoists, Derricks
ORD Finishing Machines
LESCHEN Wire Rope
TRACKSON Crawlers
GOROCO Spreaders
Member: Associated Equipment Distributors

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LONDELIOUS Water Heaters
SASGEN Derricks, Winches
AUSTIN Trenchers and Back-
fillers
TOLEDO Torches
McKIERNAN-TERRY Pile
Hammers
INTERNATIONAL HAR-
VESTER Tractors
AEROIL Torches, Heaters
ARCHER Tubular Towers
MORITZ Shouldering Ma-
chines

Contractors' Equipment Co., Inc.

5139-5169 Martin St., Detroit, Mich.

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MOORE Speedcranes, Shovels Draglines
DOMESTIC Pumps and Hoists
LEACH Mixers and Mast Plants
GARDNER-DENVER Air Compressors and tools
MULTI-FOOTE Pavers
HUBER Rollers
CEDAR RAPIDS Crushers and Gravel Handling
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A complete line of Construction Equipment

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Detroit, Mich.

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Coal Chutes
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Carpenters' Brackets, Ladder Jacks, Mortar Board Stands,
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Also
Equipment for Concrete Products Plants, Concrete Mixers,
Pumps, Engines, Saw Rigs, Gas and Electric Hoists, Shovels,
Air Compressors, etc.

THE KELLOGG-BURLINGAME CO.

67 Market Ave., N. W. Grand Rapids, Mich.

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Novo Engine Co.
Butler Bin Company
Freeman Manufacturing Co.
Knickerbocker Co.
Union Steam Pump Co.
F. E. Myers & Bros. Co.
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Jones-Superior Machine Co.

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6331-51 Tireman Ave. Detroit, Mich.

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THE PARSONS CO.
C. H. & E. MFG. CO.
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ACME ROAD MACHINERY CO.
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ROGERS Trailers
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W. O. I. Products Co.
Kohler Die & Specialty Co.
Bull Dog Floor Clip Co.
Union Steel Products Co.
J. P. Curry Mfg. Co.
Eos Meyer Hecht Co.
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Smith Engineering Works—Gravel Washing and Rock Crush-
ing Machinery
General Excavator Co.—Gasoline Cranes
Wood Shovel & Tool Co.—Motor-driven Shovels
Keystone Driller Co.—Drills and Excavators
Rome Mfg. Co.—Rome Graders

Pingry Tractor & Equipment Co.
120-6 Scribner Ave., N. W., Grand Rapids, Mich.

Representing

CATERPILLAR—Tractors, Road Machinery, Combines
EUCLID—Automatic Scrapers, Wagons
LAPLANT-CHOATE—Bulldozers, Trailers, Backfillers, Wagons
KILLEFER—Road Rippers, Revolving Scrapers
ATHEY—Track-type Wagons, Trailers
PIONEER—Gravel Equipment—Universal Crushers
WAUSAU—Snow Plows, Tractor Equipment

LANGE TRACTOR & EQUIPMENT COMPANY

304 Lake Avenue, So. 192 Park Street
DULUTH, MINN. PORT ARTHUR, ONT.

Representing

CATERPILLAR TRACTOR CO.—"Caterpillar"
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LA PLANT-CHOATE MFG. CO.—Bulldozers, Backfillers, Wagons and Snow Plows
PIONEER GRAVEL EQUIP. MFG. CO.—Gravel Equipment
KILLEFER MFG. CORP.—Road Tools, Farm Implements
WILLAMETTE-ERSTED CO.—Tractor Hoists

NORTHFIELD IRON COMPANY
487 Nico St. Northfield, Minn.

N. W. Distributors
BRITEMARK—Traffic Markers
HUG—Roadbuilder Trucks
OSHKOSH—Four wheel Drive Trucks
ROOT SPRING Truck Scrapers
TRUCK and TRACTOR Snow Plows
LANSING—Scrapers, Concrete Mixers, etc.
PANAMA—Mixers and Concrete Machinery
TOLEDO—Trenches and Steel Horses
GROUNDHOG Revolving Tractor Scrapers
RELIANCE—Rock Crushers and Screening Plants
INDESTRUCTIBLE—Grader and Conveyor Belts
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 RANSOME Towers, Mixers and Pavers
 SASGEN Derricks and Winches
 UNION Pile Driving Machinery
 UNIVERSAL Form Clamps
 WESTINGHOUSE-NATIONAL Air Compressors

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 Cincinnati's Largest Equipment House
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 Littleford Bros.—Asphalt Hoppers, Tools and Oil Burners
 Orr & Sombower, Inc.—Electric and Gasoline Hoists, Boilers
 Patent Scaffolding Co.—Scaffold Equipment
 Sagen Derrick Co.—Derricks, Winches
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 Western Wheelbarrow Co.—Earth Moving Equipment
 Wickwire-Spencer Steel Co.—Wire Rope
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 Foote Co.—Pavers
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 Sullivan Machinery Co.
 American Hoist & Derrick Co.
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 McKiernan-Terry Corp.
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 Member: Associated Equipment Distributors

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Sullivan Portable Compressors and Tools
Barnes Pumps
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Concrete, Mortar and Plaster
Mixers
Dobble Fdy. & Mach. Co.
Derricks and Fittings
Byers Machine Co.
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Cranes, Draglines and
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Rock Drills, Air Tools, Etc.
McKiernan-Terry Corp.
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Sagen Derrick Co.
Derricks, Winches, etc.
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Chain Belt Co.
REX Mixers and Pavers
Butler Bldg. Co.
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Trackson Co.
Wehr Co.
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Armco Ingot Iron Culverts
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Lakewood Engineering Co.
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Littleford Bros.
Construction Machy. Co.
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SCHRAMM IN2.—Air Compressors, Pneumatic Tools
McCLOSKEY—Torches
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Willamette-Ersted Company
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If you find any errors while checking over this directory will you please advise us at once, because it is our desire to keep it accurate and up-to-date at all times.

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220-222 E. Water St. Portland, Ore.*Representing*

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METALWELD, INC.—Portable Air Compressors
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HANSON CLUTCH MACHY. CO.—¾-yd Shovel
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Blaw-Knox Co.	S. Flory Mfg. Co.
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Buffalo-Springfield Roller Co.

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NIAGARA CONCRETE MIXER CO. —Vibrating Screws
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Speeder Machinery Corp.
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Perry Company
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Blystone Mfg. Co.—Plaster Mixers
Red Star Products Corp.—Red Star Wheelbarrows, Concrete Carts
Newo Engine Co.—Engines, Hoists, Pumps
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ATHEY
EUCALID
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WILLAMETTE
KILLEFER
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Louden Machinery Co., Barn Equipment
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BATES Tractors
ROME Graders
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BERG Concrete Surfaces LAKEWOOD Road Equip-
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Tools RED STAR Barrows & Carts
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and Concrete Accessories

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AMERICAN STEEL SCRAPER CO.
Wheelbarrows—Scrapers—Road Drags
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Hercules "Red Strand" Wire Rope
MORSE-STARBRETT PRODUCTS CO.
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Penna.

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Hotchkiss Steel Form Co.
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National Hoisting Engine Co.
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National Brake & Electric Co.

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ORR & SEMBOWER —Hoists
DOMESTIC ENGINE & PUMPS
PUMP CO. —Pumps
JONES SUPERIOR —Saw Rigs
LINK-BELT —Shovels
PENNA. BOILER WORKS. —Boilers

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INGERSOLL-RAND—Compressors
UNIVERSAL—Truck Cranes

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"American-Terr" Derricks
"Ramome" Building and Paving Mixers
"Domestic" Road, Diaphragm, and Auto-Primers
Pumps
"LeBar" Self-Priming Centrifugal Pumps
Hercules Road Rollers
Northwest Power Shovels and Cranes
"Berg" Highway Surfaces
Gardner-Dever Compressors and Drills
"Wheeling" Roller Bearing Crushers

EDELEN & BOYER COMPANY

Office and Warehouse Philadelphia
238 N. 23rd St. Penna.

Distributors for

Lima "101" Shovel, Crane & Trencher
General Shovels, Cranes, Skimmer, Back Hoe
Multi Foot Pavers
Flory Hoists
Freeman Turntables
Holtzel Steel Road Forms
Holtzel Sidewalk & Gutter Forms, Bins and Batches
Sanger Derricks & Elevators
Sangerman Drag Scrapers and Cableways
Wander Mixers and Pumps
Milne Block Machines
Pulsmeter Steam Pumps
CMC Gasoline House
Oimsted Platform Trailers
Hayward Clamshell Buckets
Archer Concrete Towers and Chuting Plants
Marsh-Capron Mixers
Mario Mud and Water Pumps
Bay City Truck Cranes
Halls Loaders, Unloaders and Belt Conveyors
True-Lay Steel Cable
Raynolds County Furnaces
Jackson—Wheelbarrows, etc.

Member: Associated Equipment Distributors

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"Everything for the Contractor"

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Representing

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WAPPAT GEAR WORKS—"Alta" Saws and Electric Tools
BUHL COMPANY—Air Compressors
CLEVELAND ROCK DRILL CO.—Air Tools
Fox Shovels, Lansing Wheelbarrows and Miscellaneous Small Equipment for the Contractor
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Contractors' Equipment

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BLAW-KNOX COMPANY.....Road and Sidewalk Forms, Bins, Etc.
A. W. FRENCH & CO.....ORD Concrete Road Finishing Machine
ALLIS-CHALMERS MFG. CO. "MONARCH" Tractor
LITTLEFORD BROS.....Tar and Asphalt Heating Equipment
GENERAL EXCAVATOR CO. Gas Shovels, Cranes and Draglines
BARNES MFG. CO.....Force Feed and Diaphragm Type Pumps
J. D. ADAMS CO.....Earth Moving Equipment

GILES & RANSOME

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BLAW-KNOX CO.—Clamshell Buckets, Steel Forms, Steel Buildings, Steel Bins
RICHMOND SCREW ANCHOR CO.—Concrete Specialties
THE BARNES MFG. CO.—Centrifugal Diaphragm and Force Pumps
NORTHWEST ENGINEERING CO.—Gasoline Cranes and Shovels
ORD—Road Finishing Machine
CLYDE—Hoisting Engines and Derricks

Member: Associated Equipment Distributors



SERVICE SUPPLY CORPORATION

20th and Venango Sts.
PHILADELPHIA, PA.

Chain Belt Co.—Rex Pavers, Mixers, Pumps
Owen Bucket Co.—Clamshell Buckets
Lidgerwood Mfg. Co.—Hoists, Winches, Cableways
Dravo Equipment Co.—American Tubular Towers
Hercules Co.—Road Rollers Union—File Hammers
International Harvester Co.—Industrial Tractors
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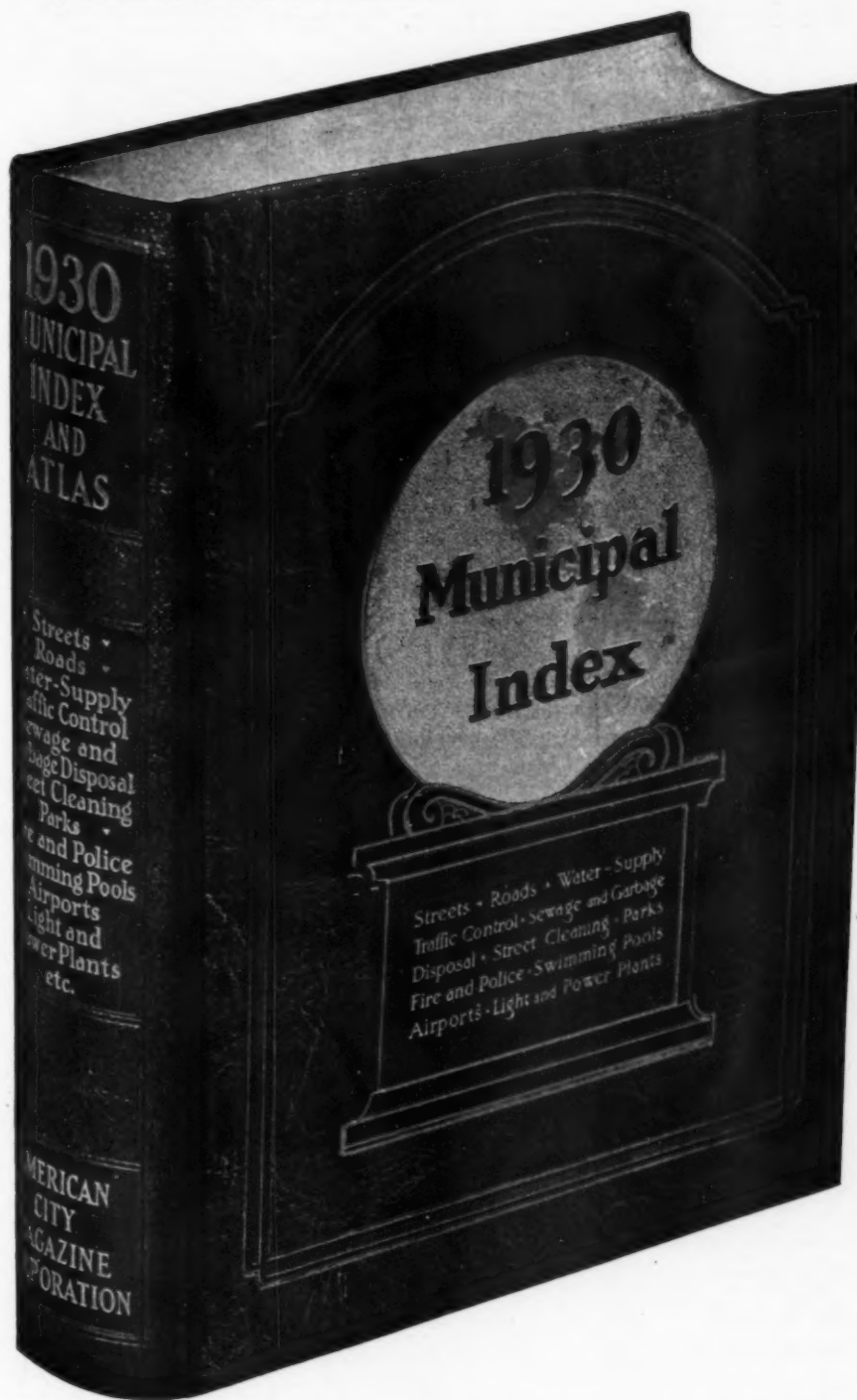
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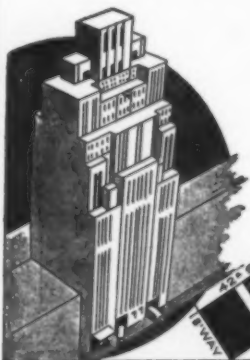
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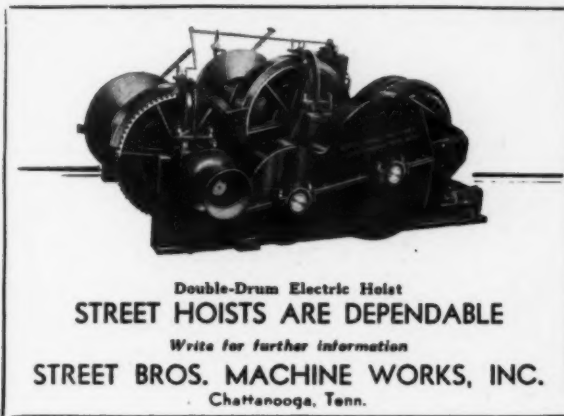
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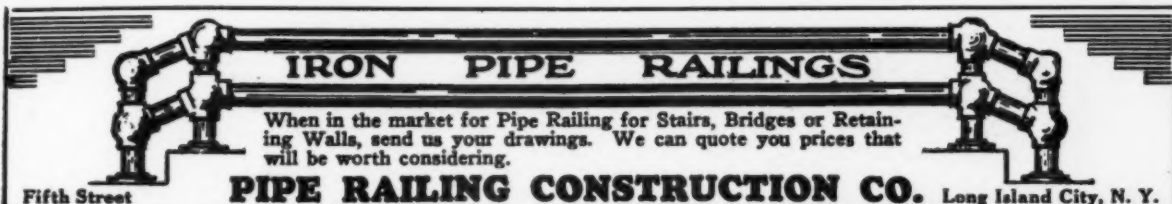
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